

Emotion
in Man and
Animal

ITS NATURE AND RELATION
TO ATTITUDE AND MOTIVE

By

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PREFACE

Although this volume has been arranged in a form convenient for classroom use, I have aimed to make it more than a textbook. I have attempted to bring a degree of order into the abundant but highly disorganized assortment of facts relating to feeling, emotion, and attitude. To tie together these diversified facts in an orderly way, the assumption has been made that there are multiple aspects to a single psychological event. Since each aspect is based upon a particular point of view or attitude, this method of analysis is called the attitudinal approach.

In the present study the central point of reference is the *individual* who experiences an emotion and reveals it in behavior. It must not be assumed that body and mind are two separate entities, but rather that the individual is one integrated psychobiological whole. This assumption of *biological monism* underlies every part of the present work, making it possible to harmonize what would otherwise appear to be unrelated or conflicting observations upon emotional processes. This conception puts the wealth of physiological material and the subjective descriptions of emotion in proper perspective, and it relates them to observed emotional behavior.

Second in importance only to the assumption of biological monism is the basic postulate, adhered to consistently throughout this study, that an emotion is a disruption or disorganization of the total individual, and not an integrated process.

The aim of this study is far from a purely theoretical one. The facts and principles here presented have practical bearings upon child development, education, social psychology, anthropology, and related fields, as well as upon the conflicts and adjustments of everyday living. This book is intended for students who have had an introductory course in psychology. It has been used at the University of Illinois as a textbook for a course upon feeling and emotion. It may be employed as a second book in courses dealing with special topics—motivation, adjustment, personality, learning.

Although not indicated in the table of contents, *Emotion in Man and Animal* contains six main parts. The first part (Chapter I) is a preliminary discussion of the nature of emotion and the definition of the concept. The second part (Chapters II and III) is a study of attitudes and motives—the basis of man's affective life. The third part (Chapter IV) is a consideration of the affective development of the individual, the genetic aspect of feeling and emotion. The fourth part (Chapters V and VI) is a survey of bodily changes in emotion. These chapters present a condensation of researches upon the physiology of emotion. The fifth part (Chapter VII) stands by itself as a discussion of the subjective aspect of feeling and emotion. The conscious aspect is regarded as only one phase of a complicated psychobiological process. The sixth part (Chapters VIII, IX, and X) is an analysis of the main causes, conditions, and forms of the affective processes.

The concluding statement at the end of each chapter, rather than being a summary, is made up of broad generalizations based upon the contents of the chapter viewed in the light of the entire study. The same can be said of the general conclusion at the close of the book.

The bibliography at the end of each chapter includes the works cited in the text and a few additional titles which will be serviceable for purposes of orientation and further study. Excellent summaries of the literature dealing with feeling, emotion, and attitude are now available. The reader has been directed to the more important bibliographic sources in notes at the end of the chapters.

Much of the material for this study was assembled in 1939-40 at the Institute of Human Relations and the Sterling Memorial Library at Yale University. I wish to express my sincere appreciation to Yale University and to Drs. Mark A. May and Roswell P. Angier for placing at my disposal every facility needed for this work.

A pre-publication edition was read critically by several psychologists and was tested as a textbook in the classroom at the University of Illinois. For a critical reading of the manuscript and valuable suggestions for its improvement I am indebted, among others, to Drs. E. E. Anderson, H. H. Anderson, W. A. Hunt, O. H. Mowrer, and L. A. Pennington. Dr. Walter B. Cannon was so kind as to

criticize those portions of the manuscript which deal with the physiology of emotion, including an account of his own brilliant researches. Prior to publication Professor H. S. Langfeld read the entire manuscript and offered much helpful advice for its improvement. My greatest obligation, however, is to my wife, Josephine Kennedy Young, who gave unstintingly of her time to improve the style and readability of the text.

It is a pleasure to acknowledge the coöperation of many authors, editors, and publishers in granting permission to use the longer quotations and the illustrations. Credit has been given at the appropriate places in the text.

Since war conditions do not permit a separate dedicatory page, I wish here to inscribe this volume to my children, Rosemary and Stewart, who were the source of much of the inspiration and some of the illustrations for the work.

PAUL THOMAS YOUNG

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CHAPTER I

THE NATURE OF EMOTION

A child darts out from behind a tree directly in front of an approaching auto. Brakes are jammed. The wheel is whirled. The car misses the child by inches. An instant later the driver emerges. He is pale; sweat is on his brow. His breath comes irregularly. His muscles are limp. His heart palpitates. "A close call," he says hoarsely.

During the crisis the driver acted automatically, in the fraction of a second making the correct moves. The brief crisis over, he became aware of disturbing emotional excitement. Here we have illustrated the two major aspects of emotional behavior, adaptive movement and an acute bodily disturbance.

An emotion is an *event*, a complicated natural process, not just a feeling and much less some mysterious "mind stuff." An emotion is a natural occurrence as truly as a sunrise is, or an earthquake, or the swaying of a tree in the wind. All these events are complex processes going on within nature. They are so complex that analysis must be made piecemeal and from different points of view.

Aspects of Emotion. As with any other complex occurrence in nature, an emotion can be observed and analyzed from different points of view. To use an analogy, when a house is on fire it may be viewed from the front or the back; it may be photographed from an airplane or described by a man inside it. Moreover, different on-lookers have diverse interests in the burning house. To one the conflagration is a spectacle of beauty, to another it represents an economic loss, to a third it means the tragic loss of keepsakes or of a home of treasured memories. Just as there are various aspects of the burning house and varying interests in it, so there are diverse points of view from which one may consider human emotion.

From the standpoint of the individual who experiences an emotion, the event is a conscious feeling. Such words as *fear*, *anger*, *joy*, *grief*, *excitement*, *jealousy*, *disgust*, and *embarrassment*, carry the meaning of *felt experience*. From a strictly objective standpoint, an emotion may be recognized through the characteristic behavior exhibited by the subject. He may weep, scream, pace the floor, wring his hands, attempt to attack an enemy or to escape from him; he may merely shuffle his feet or frown or show any of a large number of other forms of emotional behavior.

Again, an observer may notice other less obvious changes in the emotionally upset individual, such as pallor, blushing, perspiration, trembling, and heavy or irregular breathing.

There is also the point of view of the physiologist examining in his laboratory the internal chemical and visceral changes in emotion—changes especially in blood content and in the functioning of smooth muscles and glands.

And finally, all the above aspects of emotion must be viewed in relation to the external situation which evokes them—the enemy feared, the sweetheart loved, the job which deprives one of an opportunity for self-expression, and so on.

IMPORTANCE OF EMOTION IN HUMAN LIFE

Emotion influences profoundly, and in countless ways, the lives of men. An understanding, therefore, of the nature of the various emotions is a matter of practical importance. The relation of emotion to a few of the vital concerns of life—health, education, personal adjustment, warfare—will be considered briefly here by way of illustration.

Emotion and Health. The mind and the body are not two separate entities. A man is not a body plus a mind, but one whole individual, with psychological as well as physicochemical characteristics. Therefore, any factors which affect the emotional life of the individual will inevitably affect his entire physical state.

Between emotional states and bodily health there exists a two-way relationship. On the one hand, severe mental conflicts, persistent anxieties, and intolerable sense of failure and frustration leave unmistakable marks upon the health of the individual. On the other

hand, physical conditions like fatigue, illness, hunger, and pain tend to lower emotional thresholds, to increase the frequency and severity of emotional outbursts.

Many of the injurious effects upon health induced by emotional frustration are familiar to everyone. For example, it is commonly recognized that persistent anxiety concerning the affairs of business, love, health, war, or other important matters may lead to a variety of bodily symptoms, such as headaches, insomnia, loss of appetite, and loss in weight.

Emotional conflict is known to be a factor in the etiology of many functional disorders. Gastric neuroses (nervous indigestion), functional heart disorders, spastic colitis, constipation, urinary frequency and enuresis, menstrual disorders, and malfunctioning of the endocrine glands are included in this list.

In exophthalmic goiter (Graves' disease), anxiety, fears, and mental shock are especially important predisposing causes. On page 390 we have presented a case which shows a striking relation between anxiety over business relations and loss of health due to exophthalmic goiter.

Anger is associated with increase in blood pressure which, in individuals already suffering from some organic disorder, may prove dangerous. In persons subject to angina pectoris an intense outburst of anger has been known to bring on a fatal attack.

A prolonged state of grief is depressing to the digestive processes, endocrine activity, and to metabolism generally. On the other hand, joy, pleasant surroundings, and good news facilitate these processes. The relationship between digestion and emotional states is widely recognized.

A sense of failure, with its accompanying embarrassment and humiliation, often leads to broken health and premature old age. Many interesting cases showing the effects of frustration upon health may be found in a book by Dunbar (1935),¹ *Emotions and bodily changes*.

¹When a reference is cited the year of publication appears in parentheses after the author's name. The complete title can be found in the reference list at the close of the chapter. Brackets at the end of a quotation indicate the inclusive page numbers in the source from which the quotation is made. Occasionally brackets are used to indicate an interpolation not in the original.

Emotion and the Educative Process. Progress along the path of learning may be retarded by many minor emotional upsets, such as over-anxiety about examinations, resentment over extra-long reading assignments, and personal antipathy for an instructor. In addition, students may encounter more seriously disturbing emotional events, whose source is quite outside the college halls. For example, a young woman in one of the writer's classes learned of her brother's death in the siege of Bataan. The news came just before an important examination and quite naturally was so upsetting that her examination had to be postponed. Another student was so upset over a tempestuous love affair that she could not carry on with her accustomed habits of study.

It is not only in these ways that education and emotion are related. There is a more direct and fundamental relationship between the two.

On account of the importance of emotion in human life, educators have sought to find some means of training and developing the emotional side as well as the intellectual of the pupil. To this end the American Council on Education in 1933 appointed a special committee to investigate the relation of emotion to the educative process. Prescott, the chairman, and his collaborators took as their main objectives to determine: (1) whether emotion has been unduly ignored in the stress laid upon the acquisition of knowledge and upon the development of skill in acquiring knowledge; (2) whether education should concern itself with the strength and direction of desires developed or inhibited by the educational process; (3) whether educators have overemphasized an attitude of neutral detachment (desirable in the scientific observer), thereby robbing American youth of enthusiasms and loyalties; and (4) whether there exist suitable educational devices by means of which emotional development can be accurately described, measured, and directed.

The findings of Prescott's committee (1938) are of great practical importance. In a letter of transmittal to the American Council on Education are these words:

World political developments, new devices for ⁸swaying the emotions of entire nations simultaneously, emphasis on blind mass fervor, impatience with the scientific approach to national problems, all have driven home the lesson that the job of education is not done when knowledge is disseminated and

increased. If the scholar, concerned with his primary business of knowledge, fails to deal with the whole man, particularly with the control of passion and the guidance of desire, he may properly be charged with contributory negligence when the democracy becomes either a mob or a regimented army, when freedom to learn or to teach disappears, when the neglected emotions submerge the life of reason, and so force recognition of their claim to a share in the lives of men. [vii]

Certainly it is true that the human individual is very far from a coldly logical thinking machine. It is a wholesome sign, therefore, that educators more and more are taking account of the non-rational factors of human nature and that present-day psychologists are placing an increasing emphasis upon the study of motivation and emotion.

In writings upon education one meets such phrases as these: *emotional education and training, emotional development, emotional stability, emotional maturity, direction of the emotions, emotional control, swaying the emotions*. To discuss these topics adequately, one must first have a clear idea of the nature of emotion and its relation to adjustment.

Emotion and Adjustment. In the routine of daily living one continually encounters petty annoyances and satisfactions, larger frustrations and successes. A friend inconveniences you by being late for an appointment; a fall on the ice embarrasses you before your friends; a letter containing an unexpected check arrives just in time to pay a bill; your seriously ill child takes a turn for the better; a bread-winner for four persons, you unexpectedly find yourself without a job.

In each of the above experiences there is frustration or relief from frustration. In each of them some conscious emotion or feeling is evoked, a disturbed psychological state indicating a need for adjustment. The relation, then, between emotion and personal adjustment is this: states of conflict and frustration (or relief from frustration) are *revealed* by one's emotional behavior. The individual's emotional reactions indicate the need for an adjustment and help the counselor to find the source of frustration.

This is why Shaffer (1936) has said that emotion is "a type of response that is of peculiar importance to problems of adjustment." We will present here a few cases which show the relation between emotion and personal adjustment.

All of us have had the experience of disliking some person or thing without knowing exactly why. An example of this, with an explanation of its psychological background, is the following taken from Hart's classic (1914), *The psychology of insanity*:

A man, walking with a friend in the neighbourhood of a country village, suddenly expressed extreme irritation concerning the church bells, which happened to be pealing at the moment. He maintained that their tone was intrinsically unpleasant, their harmony ugly, and the total effect altogether disagreeable. The friend was astonished, for the bells in question were famous for their singular beauty. He endeavoured, therefore, to elucidate the real cause underlying his companion's attitude. Skilful questioning elicited the further remark that not only were the bells unpleasant but that the clergyman of the church wrote extremely bad poetry. The causal complex was then apparent, for the man whose ears had been offended by the bells also wrote poetry, and in a recent criticism his work had been compared very unfavourably with that of the clergyman. The rivalry-complex thus engendered had expressed itself indirectly by an unjustifiable denunciation of the innocent church bells. The direct expression would, of course, have been abuse of the clergyman himself or of his works. [73-74]

In this case the man revealed, by his emotional behavior concerning the church bells, a need for adjustment of a conflict over the clergyman and his poetry. A possible adjustment would have been for the man to make a re-evaluation of his own abilities as a poet, and regard his poetry less seriously. He might, instead, have attempted to write better poetry, or to disregard entirely the literary criticism of a simple country journalist. Any of these ways of resolving the conflict would have reduced the intensity of his emotional disturbance.

Feelings of failure and of inferiority are surprisingly common and constitute an important index of inadequate adjustment. A frequent cause of feelings of inferiority is the presence of some physical defect.

McKinney (1941) tells of a student with a physical defect in one of his legs, which caused him to walk with a limp. When talking with a counselor he insisted that he was of inferior stock. His evidence for this point was that he had always failed; people had always disliked him; his work had never come up to par. An unpleasant feeling of failure and inferiority colored nearly all his accounts of his activities.

In this case the source of frustration was obvious and probably could not be removed. But the man's emotional behavior showed that his feelings of inferiority had spread from his physical defect to all of himself, his work and his family. He needed to dissociate his attitude toward his physical defect from his evaluation of his abilities and achievements.

In both of the above cases it is clear that emotional reactions are the indicators of non-adjustment to frustrating situations.

A very different case is that of an emotional experience occurring to a friend of the writer. It was a distressing incident with a happy ending and illustrates how a sudden release from tension induces an emotional disturbance. The woman tells of her experience in this way:

She and her husband, with their two young children, spent a vacation at a lodge in the Colorado Rockies. The day they arrived, while wandering about the lovely grounds, they noticed that one side was bordered by a turbulent, swiftly rushing mountain stream, with foaming rapids pouring over treacherous rocks. The bank on the near side was a sheer cliff with a twenty-foot drop into the torrent below.

The couple remarked to each other that they must use utmost care to keep Johnny and Claire (aged two and four) from approaching or falling over the cliff.

"It would mean certain death to them," said their father. "They would be swept out over the rapids and against those jagged rocks before we could possibly get to them."

Accordingly, the parents never let the children out of their sight. As they enjoyed the beauty of the mountains, the children always played at their side.

One morning the man was called away on business. His wife wrote letters on the porch of the lodge, the children playing near, the dangerous river a hundred and fifty feet away across the smooth green lawn. The letters finished, the mother went upstairs to her room for stamps. Ordinarily she would have taken Johnny and Claire along with her, but this time some other guests were on the porch and she left the children with them.

Just as she was ready to start back with the stamps, she heard a

scream in the hall, and Claire came bursting into her room crying, "Johnny's fallen down in! Johnny's fallen down in!"

Filled with fear and horror, the woman flew down the long flight of stairs and out onto the lawn. She could never remember her feet having touched the steps; yet the time seemed to drag as she thought over and over, "He's lost, I can't save him, there's nothing I can do, he'll die!"

There was no Johnny on the porch, no Johnny on the lawn. The forlorn hope that Claire might be mistaken faded away. Over the grass she flew to the top of the cliff, still telling herself that it was no use, her baby was dead. She was scarcely aware that someone was running after her and shouting at her; she was far too excited to understand what was being said. She reached the brim and, steeling herself, looked down to the waters below. At that instant someone grasped her arm and shook her, shouting, "Johnny's back there! He fell down by the basement window. He's safe!"

Unbelieving, the mother gazed swiftly up and down the torrent, still looking for Johnny. Suddenly she realized what the other woman had said. She turned and ran back to the lodge. Her two-year-old, by now quite recovered from his little scare at falling into a five-foot excavation, looked up, smiling.

The mother sank to the ground, sobbing violently. She buried her head in her arms and rocked back and forth as she sobbed. Gradually she grew calm again, but there was an aftermath of weakness and trembling for some time.

Her sudden release from fear produced an emotional upset just as real as the fear itself though less intense. To this release as well as to the fear, an adjustment had to be made. This case, like the two preceding ones, shows the close relationship between emotion and personal adjustment.

Emotion and Warfare. The militarist argues that since human nature is as it is, wars are inevitable. It is true that the impulse to fight when one is thwarted and to retaliate in other ways is strongly entrenched in human nature and in the nature of the lower animals. It has been shown, for example, that the familiar responses of rage in cats and dogs occur even when the cerebral hemispheres have been surgically removed. This evidence indicates that the patterns of attack are deeply seated within the nervous system (pages 236-9). The

militarist is correct in his estimate of the strength of the fighting impulse in human nature.

The individual, however, can survive indefinitely without combat if his biological needs are met. There is no true appetite to fight as there are appetites for food, water, air, sleep, repose, and sexual activity.

Despite this, if an individual is frustrated by an insult or through some circumstance which prevents him from reaching a goal, his normal impulse is to attack, in an attempt to remove or destroy whatever thwarts him. Uninhibited angry attack is clearly demonstrated in the behavior of small children. When Johnny takes Mary's doll Mary strikes in anger; Johnny then strikes back "to get even."

In our culture these primitive biological impulses are suppressed by law and must be redirected into more peaceful channels. An individual who yields to his impulse to attack may find himself in jail. Conceivably, a similar redirection of the impulse to fight may at some future time be achieved on an international scale, thereby outlawing war.

Among primitive people it is often the custom for the soldiers to become thoroughly aroused before they go to battle. War dances and ceremonies are held in preparation for the fight. In modern warfare it is necessary to build up in the masses a determination to fight in order that the people will make the sacrifices and expend the energy necessary to carry on war. Nation-wide appeals are made for patriotic endeavor. Atrocity stories and other forms of propaganda build up a hostile attitude. The circumstances of war itself (such as the surprise attack upon Pearl Harbor) build up a will to fight.

It is not only anger which is aroused in modern warfare—the whole gamut of human emotions comes into play. The soldier at the front may do his job with but little real anger against an invisible enemy; when actual danger arises he is more apt to experience fear than anger. The bursting bombs and shells, the noise of enemy planes overhead, the suspense while awaiting enemy action or while waiting for the zero hour of attack—these circumstances evoke a sense of danger and fear in even the bravest man. How to prepare the individual soldier to face danger through military drill, discipline, and by moulding his attitude is an important problem in military psychology.

If a battle is lost, there arises a mood of depression and low spirits after the immediate relief from a sense of danger has vanished. Back home there is anxiety concerning the fate of the prisoners of war and grief over bereavement. In victory there is great relief from anxiety, a wave of joy and excitement, a triumphant exaltation, and an elevation of the level of self-esteem. The frequent accounts of rape, occurring when a city is conquered, indicate that primitive sexual impulses, too, are released by victory.

From first to last, modern warfare evokes almost every emotion possible to human nature. The serious study of emotions, attitudes, and motives, therefore, is both timely and practically important. It is an essential preliminary to the planning of a social order in which the basic needs of human nature can be met without constant fear of destruction from one's fellow man.

The recurrence of great wars, each more devastating than the last, engenders a growing opposition to the display of hostile emotions in combat. As Cannon (1929) has put it: "War has become too horrible; it is conducted on too stupendous a scale of carnage and expenditure; it destroys too many of the treasured achievements of the race; it interferes too greatly with consecrated efforts to benefit all mankind by discovery and invention; it involves too much suffering among peoples not directly concerned in the struggle; it is too vastly at variance with the methods of fair dealing that have been established between man and man; the human family has become too closely knit to allow some of its members to bring upon themselves and all the rest poverty and distress and a long heritage of bitter hatred and resolution to seek revenge."

The problem of eliminating human warfare is too complex to be solved by any one man. The elimination of war will require the coöperation of many persons who are specialists in government, law, history, economics, political science, psychology, education, military science, and other fields. The psychologist's rôle in this coöperative endeavor is to portray human nature accurately and to show how human behavior can be controlled.

We have been considering the part emotion plays in four important phases of human living. In all other vital concerns of life, such as marriage and the carrying on of one's life work, the influence of

emotion is equally profound. Our task now is to take up the study of emotion itself.

THE IDENTIFICATION AND CLASSIFICATION OF EMOTIONS

The use of the term *emotion* by poets, philosophers, psychoanalysts, psychiatrists, psychologists, and others has been so varied and confused that some have suspected *emotion* of meaning exactly nothing. Thus Bentley (1928) asked the question, "*Is 'emotion' more than a chapter heading?*" And Duffy (1941) in a critical article wrote: "I can therefore see no reason for a psychological study of 'emotion' as such. 'Emotion' has no distinguishing characteristics. It represents merely an *extreme* manifestation of characteristics found in some degree in all responses."

In view of such misgivings it is important to inquire how emotions can be recognized, distinguished, and classified.

Identifying and Naming the Emotions. How can specific emotions be recognized and distinguished from each other? A good many people believe that they are able to identify an emotion on the basis of facial expression. As a test observe the photographs in Plate I, attempt to name the emotions portrayed, and describe the situations likely to induce them. The inducing situation for the expression in the first picture is not known; this photograph may be used to compare the judgments of different persons. The situations arousing the facial expressions shown in the other views are described in the legend.

The problem of identifying emotions from facial expressions has been studied experimentally by Landis (1924). He aroused genuine emotions in human subjects and then photographed the subjects. To evoke emotion the following situations were employed: listening to music, reading the Bible, smelling ammonia, hearing a loud noise, writing out a *faux pas*, viewing pictures of skin diseases, pornographic material, and art studies, reading sex case histories, handling live frogs, decapitating a rat, experiencing electric shocks, and, finally, relief from these various ordeals.

As an aid in the analysis of facial expressions dark marks were placed upon the subject's face. Measurement of the distances between these marks on the photographs revealed the degree to which differ-



3



4

PLATE I. EMOTIONAL EXPRESSIONS OF A CHILD. (*Courtesy of Dr. Myrtle B. McGraw.*)

The photographs are those of a female child at the ages shown. Figure 1: Age six and a half months; the situation not known. Figure 2: Age nine and a half months; attending to an object or toy about to be revealed. Figure 3: Age twelve months; an expression of interest or pleasant attentiveness which is a response to an adult talking to her, trilling the tongue, etc. Figure 4: Age thirty months; angry crying in response to being pinched.

ent groups of facial muscles were contracted in emotional states and at rest. The subjects also gave verbal reports of their emotional experiences.

After measuring the photographs and studying the verbal reports, Landis made the following generalizations (his statements are not quoted literally):

1. For each experimental situation wide individual differences existed in the facial expressions evoked. For the total group of twenty-five subjects no fixed pattern of expression was common to any single situation.
2. Each individual tended to use some particular group of facial muscles habitually, to the exclusion of others. This tendency gave certain characteristic facial patterns to each person.
3. With not one of the emotions reported did a muscle or group of muscles contract sufficiently to be considered as characteristic of the stated emotion.
4. When the subjects were instructed to imagine some emotion, no uniform relation could be found between the facial expression and the emotion which was imagined.
5. When the emotional expressions were ranked according to the gross amount of facial musculature involved, the rank order was found to be: pain, surprise, anger, exasperation, crying, disgust, sexual excitement, revulsion.

On the basis of these and other generalizations Landis concludes that an emotion, as it is observed in the face, is not a true pattern of response as is, for example, the wink reflex. He suggests that the common names of emotions typically refer to the *situations* which induce them rather than to the facial patterns of response. Also, he says that the *degree of general disturbance* may be a factor which aids one in naming an emotion, but *not* the facial pattern or the subjectively experienced reaction.

This rather negative result of Landis is contrary to findings of certain other psychologists who utilized the photographs of facial expressions posed by skilled actors, instructing their subjects to name the emotions represented. Landis believes that *posed* expressions are conventional and that they are used in communication much as the spoken word is employed. Certainly everyone knows how to look pleased at a tea and how to appear shocked or annoyed when it is expected of him. It is likely that if the conventional expressions of shame, anger, joy, or grief are posed, they will be recognized by other persons within the same cultural group.

Landis draws a distinction between *social* and *emotional* expressions. The latter are reflexive patterns of response but, as pointed out above, the common names of emotion do not designate these stable patterns of facial response. Nor, Landis assures us, can emotions be identified from them.

One difficulty with the use of portraits in identifying the facial expressions of emotion is that these pictures present only a portion of the data which are available in actual life. Photographs are static; they do not reveal the constant changes of expression which occur.

Further, as Kanner (1931) has noted, still photographs lack features which are observable in reality; e.g., they do not reproduce the blush or the pallor (vasomotor features); they show inadequately the secretions of lacrimal, sudorific, and salivary glands—which are frequently affected during emotional excitement. Activity of the hair-raising (pilomotor) muscles, too, is less visible in photographs than in actual life. Gestures and postures are often left out of the picture. The complex disturbances of respiration, too, are incompletely shown by the momentary position of mouth and nostrils presented in the photograph. Also, a photograph of the face gives little or no clue to visceral and general somatic responses. Most important of all, perhaps, is the fact that the psychological situation which induces an emotion is entirely left out of account in a photograph of facial expression. Hence, to judge an emotion from a still photograph of the face is at worst a guessing game and at best an art which tests the ability of the judge.

Some of the experiments upon recognizing emotion from photographs of faces have isolated part of the face for judgment, as the eyes or the mouth. This still further limits the clues available for judgment. Arnheim (1928) showed, in this connection, that we can judge with greater consistency when observing the total configuration of a face than when making our judgments upon the separate features. Extending this principle of *Gestalt*, we assume that the more complete the data which the judges have before them, the more consistent will be their identifications of the emotions.

In keeping with this principle are results obtained by Sherman (1927). Instead of stills he used motion-picture views and gave his judges the opportunity to make first-hand observations of the emo-

tional behavior of infants. In this work several groups of judges were employed, all presumably qualified to pass upon human behavior—graduate students in psychology, medical students, nurses in training, and normal-school freshmen.

To induce an emotional state Sherman used the following techniques: a delay in feeding (hunger); dropping (fear); restraint of movement (anger); sticking with a needle (pain). The pleasing emotions, *e.g.*, joy and amusement, were not represented. After taking moving pictures of the responses, Sherman prepared films to show: (1) the stimulating circumstances and the ensuing responses of the infant; (2) the responses only; (3) each stimulating circumstance followed by the response to a different situation. Besides presenting motion pictures to his judges, Sherman used a more direct method. Infants were stimulated behind a screen which was then removed. This last technique made it possible for the judges, without seeing the actual stimulating situation, to hear the outcry, see the color of the skin, and get other clues lacking in the motion pictures, as to the nature of the emotional response.

The judges were instructed to name the emotion and to describe its most probable cause. Some of Sherman's results are presented in Tables 1, 2, and 3.

Table 1 records the distribution of judgments made by a group of forty-six graduate students in psychology upon the emotional responses of the infant as seen in motion pictures. The judgments were based solely upon the pattern of response and with no indication of the inducing situation. The table shows the four kinds of stimuli calling forth affective reactions, but this information, of course, was not given in the film.

An inspection of the figures shows that there was little agreement between the emotions named and the answers to be expected on the basis of the inducing situations. The totals at the right give the frequency with which the various emotions were named. *Anger* was the most popular judgment. Others frequently mentioned were fear, hunger, and pain.

When the judges assigned causes for the emotions, however, there was much greater uniformity (not shown in the tables). For example, in deciding upon causes for the emotion of anger, 85 per cent of the judges named pain or pinching or the preventing of free move-

ment. This shows that a given emotion is associated in the popular mind with certain inducing causes. (Or perhaps the graduate students knew too well the common techniques for making babies cry in the laboratory!)

TABLE 1
JUDGMENTS OF GRADUATE STUDENTS IN PSYCHOLOGY OF FILMS
IN WHICH EMOTIONAL RESPONSES ONLY ARE SHOWN

Emotion named	Number of students naming the emotion elicited by:				
	Hunger	Dropping	Restraint	Sticking with a needle	Total
Hunger	7	6	2	2	17
Anger	11	14	13	8	46
Fear	7	5	5	9	26
Pain	3	3	4	2	12
Grief	1	1		1	3
Hurt				1	1
Rage	2	1	3	1	7
Discomfort			1		1
Sleepy			1		1
None				1	1
Consternation	1	1			2
Nausea		1			1
Physical discomfort			1		1
Total*	32	32	30	25	119

* The totals are not identical in the columns of Tables 1, 2, 3, because some observers did not make judgments upon every reaction displayed.

Table 2 presents judgments of a group of third-year medical students who observed actual emotional responses in a nursery. Only a few students at a time made the observations. Infants (between the ages of 112 and 160 hours) were selected at random and stimulated behind a screen. The screen concealed the stimulating conditions but was removed so that the response was immediately observed in real life—crying, flushing of skin, and all.

An examination of these figures indicates that there was no better agreement among the medical students than among the budding psychologists as to the emotions aroused. With both groups of subjects the agreement was poor. The names used to designate the emotions were somewhat different in the two groups, the medical

students, for instance, referring most frequently to *colic*, which the psychologists did not mention once. The psychologists used such names as *rage*, *grief*, *consternation*, which did not appear in the designations of the medical students. But the important finding here is that infants in real life gave no better clues to the kinds of emotion they were experiencing than did moving pictures of their responses.

TABLE 2
JUDGMENTS OF MEDICAL STUDENTS OF ACTUAL OBSERVATION OF EMOTION
WHEN THE STIMULI ARE NOT SHOWN

Emotion named	Number of students naming the emotion elicited by:			
	Dropping	Restraint	Sticking with a needle	Total
Hunger	6	3	3	12
Pain	3	1	6	10
Fear	2	11		13
Anger	7	3	6	16
Colic	11	6	4	21
Awakened from sleep	11			11
Bandage tight	1	3	2	6
Organic brain emotion	1	7	3	11
Total	42	34	24	100

One reason why Sherman's judges could not identify the responses with greater consistency (both with motion pictures and with living subjects) is that young infants have not learned the social expressions of emotion displayed in adult emotional behavior. Probably, also, the emotional response in the infant is about the same whether it is produced by a needle prick, restraint of movement, a pinch, or hunger. If this is true, as genetic studies indicate (Chapter IV), one cannot expect judges to be able to distinguish the emotional responses to these stimuli accurately. The problem resolves itself into one of a choice of words to use in naming a primitive emotional response. Sherman's work indicates that, when one has to choose a name, *anger* is the most preferred term for this form of response.

With adult subjects one might expect that Sherman's technique

TABLE 3

JUDGMENTS OF GRADUATE STUDENTS IN PSYCHOLOGY, OF EMOTION WHEN BOTH
STIMULUS-SITUATIONS AND RESPONSES ARE SHOWN

Emotion named	Number of students naming the emotion elicited by:				
	Hunger	Dropping	Restraint	Sticking with a needle	Total
Fear		27	4	7	38
Mad			1		1
Discontented	2		1		3
Rage			1		1
Pain	2	2	1	13	18
Negative emotion	1	1	1	1	4
Hunger	7				7
Anger	14	4	24	13	55
Discomfort	6				6
Irritation	1		1		2
Excitement		1			1
Anger or pain	1		1	3	5
Disgusted or weary	1				1
Pain with fear		1			1
Anger with fear		4	1	1	6
Rage	1	1	3		5
Total	36	41	39	38	154

would yield somewhat more consistent judgments than could be obtained from still photographs of the same subjects.

Table 3 gives the judgments of a group of graduate students in psychology when both the stimulus-situations and the responses were shown in the film.¹ Here the judgments showed much more uniformity than in the previous two tables. It is plain that when the inducing situation was made known to the judges, they agreed appreciably better than when they were kept ignorant of it. Also, the names of the emotions this time agreed more closely with accepted beliefs as to the relationship between inducing situations and emotions.

It is interesting that anger was again the most frequently mentioned emotion.

Sherman rightly concludes that knowledge of the inducing cir-

¹ This table is abbreviated. In addition to the emotion names shown, there was one mention of each of the following: surprise, resistance to restraint, anxiety, hate, restiveness, repulsion, suffocating. For some unknown reason the term *rage* appears twice in Table 3.

cumstances is a major factor in identifying an emotion. In other words, an emotion is not recognized purely by the observed response but rather by the situation-response relationship. The infants' emotions were differentiated by Sherman's judges in terms of the response pattern *plus* the psychological situation which induced the response.

Sherman's findings corroborate the above statement of Kanner that the more complete the information about the emotional response plus the situation which induces it, the greater the consistency of recognition and naming. Other psychologists, too, have questioned the view that an emotion can be recognized solely by its specific pattern of response. For example, Dashiell (1928), after reviewing the experimental facts, expressed doubt as to the existence of specific emotional patterns.

There are, he said, referring to experiments dealing with this problem, two possible explanations of the negative results: (1) There *are* emotional patterns in the organism which correspond to the conventional names—despair, love, joy, grief, anger, fear, ecstasy—but the visceral core of each remains to be discovered. (2) A very different explanation is that names conventionally used to designate different emotions refer to varying forms of viscerally facilitated or inhibited *overt behavior patterns* that have been classified and labeled more in terms of their *social* significance than in terms of their visceral components. (Landis, also, it will be recalled, distinguished between social and truly emotional expressions.)

In addition to the two explanations suggested by Dashiell, there is at least one other possibility: (3) There *are* emotional patterns of response which do not correspond to the conventional names. In Chapter VI we shall describe patterns of response which appear during emotional excitement—the rage pattern, crying, smiling, laughing, the sexual patterns, and others. There can be no doubt as to the existence, uniformity, and primitive nature of these patterns; and there can be no doubt that the list of authentic patterns is far removed from the conventional lists of emotions.¹

¹ One difficulty in identifying and naming emotions from the pattern of response is that the term *emotion* commonly designates attitudes such as hatred, resentment, fear, love, liking, and disgust rather than actual patterns of response.

That there is an innate core of emotional response for certain emotions has been claimed by Goodenough (1931). She photographed the emotional responses of a ten-month-old infant and to the judges presented still photographs which were to be matched with statements describing the circumstances calling forth the expressions. She found that, on the average, the judges were able to match the photographs and situations correctly in 47.2 per cent of the judgments, which is 5.7 times the percentage of successes to be expected by chance. Goodenough remarks that, as the infant develops, his primitive emotional responses are inhibited, modified, and changed by social experience.

Goodenough's work does not necessarily prove that there are innate emotional patterns, which can be recognized from still photographs, for the following reason. The judges were given statements descriptive of the inducing situations and thus had more information than that obtainable from the photographs alone. Matching facial expressions and situations is very different from recognizing and naming emotions on the basis of facial expressions alone. Sherman's work demonstrates that a knowledge of the inducing situations makes for a greater consistency in identifying and naming emotions. In view of this finding, Goodenough's result is not surprising.

But despite this minor criticism of her interpretation, it may still be true that for certain emotions there is an innate core of response whose surface manifestation serves as the basis for recognizing and naming emotions.

The most likely illustration of this is the basic contrast between pleasant and unpleasant emotions. Pleasant emotions were not aroused in Sherman's experiment, and they were inadequately represented in the investigation of Landis. Thus an enlightening point may have been missed.

That some facial expressions can readily be identified as pleasant and others as unpleasant is shown by the following bit of evidence. The writer selected a series of fourteen photographs portraying various emotional expressions. On several occasions these were rated by advanced students of psychology in terms of the pleasantness or unpleasantness revealed. All told, 133 students rated the pictures. Results have been tabulated and ranked as follows:

Photograph designation	Frequency of rating		
	<i>Pleasant</i>	<i>Indifferent</i>	<i>Unpleasant</i>
N	132	0	1
C	131	2	0
G	100	17	16
F	89	32	12
E	55	60	18
K	35	57	41
I	12	64	57
B	10	34	89
A	2	37	94
J	6	22	105
H	1	16	116
L	3	2	128
M	0	4	129
D	0	1	132

From the results one can see that there is almost complete unanimity in the judgment of certain photographs in terms of pleasantness and unpleasantness and that between these extremes of definitely pleasant and unpleasant expressions there are all gradations in the judgments.

If the reader will turn to the photographs shown in Plates X and XI (pages 253 and 257), he can tell at once which emotional state is pleasant and which unpleasant. The basic distinction between emotions of delight and those of distress can be readily drawn.

Recognition of Emotional Expressions in the Chimpanzee.

Since the behavior of the chimpanzee is similar in many respects to that of man, it is of interest to compare emotional expressions in these two primates. Although the recognition of emotions in animals is difficult and gross errors are commonly made, still a certain success can be obtained.

Before the reader is familiar with the following descriptions, let him examine the photographs in Plate II and jot down on a scrap of paper the names of the emotions portrayed. The descriptions below can be used to check the ratings as right or wrong.

These photographs were presented by Foley (1935) to 127 subjects. He instructed them to select from a printed list of names the

particular emotions shown in the pictures. Foley found that there were wide individual differences in judgment. Confusions were especially frequent between weeping (tearless), anger, and laughter.

The confusion that arises in attempting to judge the facial expressions of the chimpanzee may be illustrated by reference to a popular film entitled, *School Pals*. In this picture curious antics of the chimpanzee are depicted. At the conclusion of the picture when presumably the chimpanzee had "played a trick" upon his adversary, it was desired to convey to the audience the impression that the chimpanzee was laughing. The animal's hand, hidden from view by a board fence, was pinched or otherwise painfully stimulated. This at once elicited the typical expression of anger (Fig. 5) which, in the context, was interpreted by the audience as joy or laughter.

The photographs in Plate II represent six facial expressions of Joni, a five-year-old male chimpanzee: (1) quietude, (2) sadness, (3) laughter, (4) weeping, (5) anger, (6) excitement. These expressions and the situations which typically arouse them have been described by Foley approximately as follows:

Figure 1. The expression of *quietude* is the usual aspect of the chimpanzee when he is inactive, undisturbed, and remains in his customary environment.

Figure 2. *Depression* or *sadness*. Slight protrusion of tightly compressed lips, lifting of eyes. Observable when the ape is slightly depressed or saddened. Takes place when there is some slight delay in supplying his wants, such as in giving him food, drink, or sleeping accommodations. Noticeable upon refusal to comply with some of the chimpanzee's desires, such as to be taken into one's arms, to be given some desired object, to be permitted to escape from the cage. Also seen when experimenter or guardian for whom he feels particular affection shows signs of withdrawing. Such evidence of sadness is usually accompanied by extending of arms and soft whimpering.

Figures 3 and 4. *Weeping* (Fig. 4). The infant chimpanzee begins to cry when his desires definitely fail to be granted, especially when his guardian withdraws, leaving him alone, or when he is confined to his cage in seclusion. He also cries in the presence of frightening stimuli (e.g., a stuffed wolf, a panther skin, large live animals, such as horses or cows). He opens his mouth wide so that the teeth and gums can be plainly seen, and tilts his head slightly backwards. The ape emits a continuous deafening roar, somewhat resembling the crying of a child but incomparably louder. *No tears are ever to be seen*. This seems to be a characteristic feature of weeping in the chimpanzee. The paroxysm of crying behavior is marked by complete closing of the eyelids and wrinkling of the upper part of the face.



6

PLATE II. FACIAL EXPRESSIONS OF THE CHIMPANZEE.

These photographs of facial expressions of the chimpanzee are published through the courtesy of Professor Robert M. Yerkes and the Yale University Press. Originally, the photographs were taken by Mrs. Nadie Kohts (1935), of the Darwinian Museum, Moscow, U.S.S.R.; and they are reproduced here with her special permission.

The expression of *joy* (Fig. 3) is marked by facial movements entirely opposite to those of weeping (Fig. 4). A kind of smile can be seen; the corners of the lips are slightly lifted; the mouth is open, and panting can be heard (but no laughter is ever to be observed). The joy-causing stimuli are exactly the opposite of those causing depression or sadness, *viz.*: permission to leave the cage; the arrival of a guardian; a caress from him; playing or wrestling with him; being tickled by him. All such stimuli invariably evoke a smile or broad grin accompanied by "bustling" movements and invitation to play or "enticing" gestures.

Figure 5. The chimpanzee's *anger* is characterized by a wrinkling of the upper half of the face with a straining of the lips downward, so that not only his teeth but also his gums are plainly visible. The provoking stimulus may be the appearance of some supposedly offending animal or object which the chimpanzee is likely to attack, such as a hen, dog, or cat. Angry behavior is also to be observed toward strange people or in connection with protecting the objects which the ape understands to be his property. Again, anger usually appears when the chimpanzee is being punished, and is always present when some attack or assault is made upon the ape. Anger is expressed by a short hallooing sound, a threatening gesture of the hand, clenching of fists, and finally by striking the offending stimulus.

Figure 6. *Anxiety* and *excitement* are expressed in a trumpet-like projection of the lips, a bristling of the hair on face and body, and the vocalization of long, modulated, "oh-oh" sounds, which are a sixfold repetition of higher- and lower-pitched tones taken over a tierce within the octave.

A less pronounced form of excitement is expressed only by bristling of hair and protrusion of lips and is a common preliminary to the onset of the usual affective emotions of the ape: anger, fear tantrum, buoyant joy, despair.

When in extreme excitement the ape usually stands vertically erect and extends his arms toward the intriguing stimulus. If the emotion is not interrupted for some time the ape will repeatedly crouch down and again stand erect.

Conditions likely to call forth maximum excitement are as follows: an especial unexpectedness or novelty of the exciting stimulus; also, ignorance of the exact purport of the stimulus and concomitant absence of a specific response on the part of the ape. A concrete example: The chimpanzee was confronted with the sham fight of two men armed with truncheons and seemingly attacking one another. The make-believe combat was accompanied by loud shouting and much rattle and noise. The chimpanzee responded by plainly expressed maximum general excitement. [43-44, modified]

In this connection it might be worth mentioning that Darwin, in his book on the expressions of emotion, interprets the trumpet-like protrusion of the lips as a sign of anger, but such a conclusion does not agree with modern observations.

Words Indicating Emotion. The word "emotion" is derived from the Latin *e* (out) and *movere* (to move).¹ Originally the word meant a moving out of one place into another, in the sense of a migration. Thus: "The divers emotions of that people [the Turks]" (1603). "Some accidental Emotion . . . of the Center of Gravity" (1695). The word came to mean a moving, stirring, agitation, perturbation, and was so used in a strictly physical sense. Thus: "Thunder . . . caused so great an Emotion in the air" (1708). "The waters continuing in the caverns . . . caused the emotion or earthquake" (1758). This physical meaning was transferred to political and social agitation, the word coming to mean *tumult*, popular disturbance. Thus: "There were . . . great stirres and emociions in Lombardye" (1579). "Accounts of Public Emotions, occasioned by the Want of Corn" (1709). Finally the word came to be used to designate any agitated, vehement, or excited mental state of the individual. Thus: "The joy of gratification is properly called an emotion" (1762).

In describing emotional states, writers have commonly referred to the parts of the body presumably determining those states. In the Bible one reads the phrase "bowels of mercy." Shakespeare in *Lucrece* writes: "To quench the coale that in his liver glowes." In a record from Waltham Abbey dated 1554 are these words: "This bishop was bloody Bonner, that corpulent tyrant, full (as one said) of guts and empty of bowels; . . ." Modern slang contains similar phrases: "He has plenty of gall"; "He got his spleen up"; "He could not stomach it"; "Have a heart"; "He lacked the guts"; "Es ist ihm etwas über die Leber gelaufen [He is peeved]."

It is surprising to find how many words in the English language today are used to designate emotions and attitudes. In an experiment upon the judging of emotion from facial expression, Kanner (1931) projected upon a screen a series of thirteen photographs, each of which portrayed the facial expression of some human emotion. Students in six classes were instructed to write "the best" descriptive term for each facial expression. Ignoring duplicates, the students used

¹ This discussion of the etymology of emotion words is based upon the article "emotion" in Murray's dictionary. The first two paragraphs of this section are copied from the writer's book, *Motivation of behavior*. For a psychological discussion of terms which designate emotions and attitudes, see the book by Shand (1920).

365 terms descriptive of emotion and attitude—a term for each day in the year!

The words obtained were then grouped according to similarity of meaning. For example, the words *anxiety*, *apprehension*, *fear*, *awe*, *terror*, *horror* were placed in one group because they designate related emotional states and attitudes. No two of these words, however, have precisely the same shade of meaning. This is true also with the following group: *disfavor*, *resentment*, *anger*, *rage*, *temper tantrum*.

Kanner found that the terms could not all be placed in exclusive groups such as the two cited above. *Fear*, to illustrate, is related to *shyness* and *timidity*, but these two words are classified with *self-consciousness*. *Anger* is related to *hate* and *intolerance*, but these two words are placed in a separate group with *dislike*.

Kanner attempted to relate these 365 terms on the basis of their significance by drawing a line between two related terms. He produced a verbal maze within which one could easily get lost.

A major difficulty with emotion words is that an emotion, being complex, presents many facets to the observer. This point has been brought out in a brief note by Hunt (1935). What, he inquires, is *fear*? To one it is a sensory experience, "an awful feeling in my stomach, and cold, clammy hands." To another, fear is the attempt to escape from some danger such as a wild animal or a fire. It can be expressed: "Something is present which I would like to avoid." To yet another, a fear is the object which induces the emotional response, as when one says, "The thunderstorm is something I am afraid of." To someone else, fear is the awareness of danger with an ill-defined affective accompaniment.

The word *feeling* with its distinctly subjective connotation is even more broadly and confusingly used than *emotion*. On the use of the word *feeling*, Titchener (1924) wrote:

The word "feeling" is used in a great variety of meanings. A thing feels rough or smooth, hard or soft, sharp or blunt, firm or shaky, warm or cold, elastic or brittle, thick or thin, clammy or oily. We ourselves feel hungry or thirsty, fresh or tired, energetic or lazy, strong or weak, well or ill. We also feel comfortable or uncomfortable, we feel at home or strange, at ease or ill at ease, natural or constrained; we feel happy, cheerful, restless, angry, irritable, eager, calm. We feel hopeful, despondent, grieved, hurt, injured, relieved, contented, gloomy, anxious, annoyed. We feel indifferent, and we

feel sympathetic; we feel the difficulty of an objection, the truth of an argument, the nobility of a character, the sacredness of a belief. "Feel" and "feeling" seem, indeed, to be psychological maids of all work; they can do, in the sentence, practically anything that a verb and a substantive can be called upon to do. There is little hope, one would think, of turning them to strict psychological account, and of giving them a place in a list of technical terms. [225]

It is obvious from all this discussion that there is little hope of obtaining a sound psychology of feeling and emotion from words alone!

Classification of the Emotions. In reviewing the systems of emotions which have been worked out by philosophers and psychologists, Kanner (1931) lists, among others, the following:

Descartes specified six primary emotions: admiration, love, hate, desire, joy, sadness. Spinoza mentioned only three: joy, sadness, desire. In more recent times Jørgensen claimed that there are six fundamental elements: fear, happiness, sorrow, want, anger, shyness. Watson, the rigid behaviorist, described three primary emotions: fear, rage, love. Mehran K. Thomson, in a lengthy list, enumerated dozens of "compound emotions" which he analyzed into their components. Shand listed seven primary emotions: fear, anger, joy, sorrow, curiosity, repugnance, disgust. For McDougall the primary emotions were: fear, disgust, wonder, anger, subjection, elation, tenderness. Allport reduced the facial expression of emotion to six elementary roots: pain-grief, surprise-fear, anger, disgust, pleasure, and intellectual attitudes such as doubt. Stratton described a system of emotions including undifferentiated excitement, elation, depression, and differentiated fear, anger, and affection. Yerkes gave a scale of moods, weak emotions, strong emotions, passions. James distinguished between the coarser emotions (grief, fear, rage, love) and the subtler emotions (including moral, intellectual and esthetic feelings). So it goes.¹ There is some agreement but there are more discrepancies!

Instead of discussing the merits of existing classifications it would

¹ If the reader cares to turn to the excellent survey of Gardiner, Metcalf, and Beebe-Center (1937), he will find there further evidence of the diversity of classifications of feelings and emotions. An account is given of the speculations which have been made through the centuries upon affective and motivational processes.

be more profitable to consider why competent men have disagreed and to seek some basis upon which an agreement is possible.

No existing system for classifying the emotions is particularly useful to investigators. Instead of classifying and categorizing we shall seek to discover the psychological principles by means of which affective phenomena can be interpreted. Some of these principles are suggested by such terms as *appetite*, *aversion*, *goal orientation*, *frustration*, *conflict*, *satisfaction*, *attitude*, *compensation*, and *neurosis*.

EMOTION, A DISTURBED PSYCHOLOGICAL STATE

There is one definition which characterizes emotion by such terms as *disturbance*, *disruption*, *disorganization*, *upset*, *turbulence*, and *outburst*. These terms imply that, when emotion arises, integrated activity is hindered in some way or other.

The view that an emotion is a disturbed state of the organism is continually implied in everyday language by a variety of phrases. When a man from the city meets a grizzly bear in the mountains, he "does not know what to do." He "goes to pieces," "loses his head," "is unable to pull himself together," "to collect himself." In other words, the city-dweller is disrupted by the situation, whereas an experienced mountaineer under the same circumstances would calmly size up the situation and meet it effectively. When an inexperienced aviator is lost in a storm, he "gets rattled," "loses command of himself"; his consciousness is a "blur." In this loss of composure he may "freeze to the stick," bringing the plane to earth in a fatal crash. A more experienced flier, appraising the situation in a matter-of-fact way, makes the best of it.

In these two illustrations the emotion of fear produced a disintegration of purposive behavior. Rage, great excitement, horror, elation, and other emotional states have the same disruptive effect. A man, for example, is said to be "beside himself" with grief or joy. In general, an emotional seizure hinders whatever adaptive behavior is in progress when the emotion occurs.

The Signs of Emotional Disturbance. What are the signs or symptoms of emotional disorganization? A partial answer is given below.

First, the *process of learning is retarded* when an emotion arises.

This may be illustrated by reference to an experiment by Higginson (1930). He observed that anger and fear interfere with the maze learning of the rat. Anger was evoked by pinching the animal's tail and by stimulating the nose. Fear was aroused by placing the rat in a cage with a cat, the rat being confined to a smaller inside compartment. Immediately after the emotional stimulation, the rat was tested in the maze. The learning of emotionally excited rats was compared with that of quiescent, non-emotional controls. The emotional animals showed an *increase* in the following factors of maze learning: the time spent in running; the total time consumed in learning the maze and the number of trials required to master it; the variability from trial to trial; the total distance traversed; the number of errors made. In other words, emotionally excited rats were more prone to enter blind alleys. They were more variable and slower in maze learning than quiescent animals.

Second, a manifestation of emotional disorganization is *temporary inactivity*. A small boy, known to the writer, illustrates this principle when reproved for carelessness in his playing while practicing upon the piano. Being a sensitive child, an ordinary rebuke is likely to precipitate a brief emotional disturbance. Instead of continuing his playing, his hands drop into his lap, his head and shoulders droop, and he sits inactive, a picture of dejection, until something arrests his attention and ends the mood. In general, he learns to play his pieces on the piano faster and more adequately when the psychological situation is free from stimuli which elicit unpleasant types of response.

Temporary inactivity caused by a strange or novel situation is well illustrated in the behavior of white rats. If a rat becomes frightened or injured, he may dash for shelter and remain quietly under cover. If mildly frightened, the level of his activity will be lowered. An example of this is found in an experiment of Patrick (1931).

In this experiment ten rats were placed, one at a time, in a maze (Dashiell's exploratory maze) which invited exploration. The gross amount of random behavior in the maze was recorded. Other rats were placed in the same maze under different conditions; two electric buzzers sounded continuously on opposite sides of the apparatus. When the buzzers sounded the animals crouched, quivered, and moved about but little in the maze. Their behavior was that of

caution and timidity. If the random behavior of the first group is taken as a basis for comparison, the activity level of the frightened group is found to be lowered by 27 per cent. From this we can conclude that the noise of the buzzers produced a lowering of the activity level of the animals. This relative inactivity is an indication of fear.

Third, during emotional disturbances there are *changes in certain motor manifestations*, such as the speed of movement, muscular coördination, and steadiness. Some of these changes may be illustrated by reference to an experiment by Laird (1923) upon razzing.

Laird determined the effect of razzing by giving a series of motor tests under two conditions to eight fraternity pledges. The tests were first given under conditions of friendly competition, the members of the chapter and other pledges watching the performance with respectful silence. Two nights later the tests were repeated in a similar way except that there was free-for-all razzing of the pledges which, Laird states, was genuine and effective. The tests measured speed of tapping, muscular coördination (three-hole-coördination test), and steadiness of movement.

Results demonstrate that for all subjects there was a loss of steadiness during razzing. In the results of the tapping test and the muscular-coördination test, there were changes in scores of all subjects, but they were not uniform within the group. In speed of tapping, five subjects showed a gain and three a loss under razzing. In the scores for muscular coördination three subjects showed a gain and five a loss during the razzing, but the average for the group as a whole showed a loss.

Thus, the emotional disturbance produced by razzing was indicated by a loss in the steadiness of movement for all subjects, but the changes in speed of movement and coördination were not uniform within the group studied by Laird. We know from other evidence that stimulation sometimes facilitates a skilled performance and sometimes interferes with it, depending upon the degree of stimulation and varying from person to person. Furthermore, the effect of a social situation is not the same on all individuals.

Laird assumed that the razzing produced an emotional disturbance. The razzing consisted of personal remarks, ranging from

mildly disparaging to highly uncomplimentary ones—even to actual insults.

Every boy knows that razzing the pitcher in a ball game is likely to make him “throw wild.” If a small boy is pitching, he may become angered through remarks from the side lines. Under razzing, he is likely not only to pitch with loss of precision and motor control but also to throw his glove on the ground, stamp, thumb his nose, swear, or exhibit other excessive activity. He may walk away, refusing to play (shift of motivation). A physiological check would doubtless reveal an increased pulse rate, irregular respiration, increased sweat secretion, and chemical changes in the blood (involuntary bodily changes). Later, if the boy were able to describe his own conscious experiences during the episode, he might report that while he was “mad” he didn’t know what he was doing (confusion and blur of conscious experience).

Fourth, during emotional disturbances there are often *excessive muscular movements* which are random and aimless, such as jumping up and down, clapping the hands, laughing, pacing the floor, slashing with the arms, vocal outcries, and writhing and struggling. These are signs of intense excitation which are usually extrinsic to calm purposive behavior. The particular kind of excessive muscular movement which occurs varies with the form of emotional disturbance.

Fifth, during emotional disturbances there are *marked bodily changes in the activity of glands and smooth muscles*. Many of these changes are hidden from view and can be detected only through physiological techniques; some are outwardly visible. Inasmuch as these bodily changes will be described in detail in Chapters V and VI, no illustrations are given here.

It is important to add that no one of the above-mentioned changes is invariably present during emotional disturbance. In fear, for example, there is sometimes paralysis of movement, sometimes heightened activity. But if the above signs are taken collectively, they give a picture of the kind of phenomenon designated by the phrase *emotional disturbance*.

Is Emotion Always Disruptive? The view that emotion is a disruptive state of the whole individual, which is consciously experi-

enced and is shown in behavior, has been countered by the claim that emotional excitement is often free from disruption. Everyone has heard an account of somebody who in the face of danger acted wisely and with a very high energy expenditure, thus saving the situation from total disaster. Two illustrations of this are drawn from the writings of Stratton.

From first-hand information Stratton (1925) has recounted the complicated reactions of an aviator during a hair-raising experience when his airplane was temporarily out of control. There are at least two remarkable features of the incident. In the first place, during the danger and excitement there was no general disruption of behavior—no breakdown of motor integrations, no sudden mental blurring; on the contrary, the quick thinking and delicate movements needed to control the airplane in a tail-spin and to discover the source of the trouble remained available and were actually utilized. Secondly, all the time that this very exciting activity was going on, there was a vivid re-living of early experiences, an imaginal reinstatement with astonishing detail.

The account, as given to Stratton by the aviator, follows:

During my service as an aviator I had two accidents which were of psychological interest. [Only the first is here described.]

The first of them was at Dallas, Texas, in June or July of 1918, while I was doing that part of my training which is known as "stunts." Before going up on this particular day I, as usual, examined carefully my controls, and found that they were working right. I then went up to a height of about 5,500 feet, having planned the order in which I should go through my stunts, so that I should make as good a showing as possible to my instructor on the field below. My first stunt was a loop, and this I went through all right and straightened out. Then I found that my elevator-control was stuck. I went up on the rise for a second loop, but instead of letting my ship whip-stall and thus running the risk of permanently damaging my controls, I kicked the rudder to the right and dropped into a tail-spin.

It was at this time that a dual personality came into play. I had a rapid survey of my life, not as though I were looking at scenes of my past, but as though I were doing and living them again.

Yet I was conscious at the same time of having to manage my ship. For as soon as I started down in the tail-spin I realized that I had a certain amount of time, and I went carefully over the different controls. I tried the rudder and found that it worked all right. I then moved "the stick," and its movements showed that the ailerons were working, but that the elevator was

stuck. I thought that the elevator-wire might have become entangled in the leather slot where the elevator-wire goes through the covering to the outside. So I pushed the stick slowly and steadily forward to overcome such an obstruction. In shoving forward on my stick I felt the tension on my belt, which showed that the control was in some way entangled with the belt. So I reached around and found there the loose end of a wire used to support the triangle of the safety-belt, and which had been left too long and had become entangled in the wire which worked the elevator. I pulled this loose end out, and my elevator then worked perfectly, and I straightened out my ship. I was then at a height of about 1,500 feet, having fallen about 4,000 feet since the accident began. (The aviator estimated the rate of his fall to have been about 150 feet a second, giving a total duration of about 27 seconds for the 4,000 feet.)

During this fall I re-lived more events of my life than I can well enumerate. These were in an orderly series, very distinct, and I cannot recall that anything was out of its place.

1. One of the first things that I remembered was learning my ABC's. My grandfather was sitting in a tall easy-chair with castors attached to a frame upon which the chair rocked. I remembered him sitting as I am sitting now; and I was on the floor. That was between the Christmas when I was over two-and-a-half years old and the February when I was three. That was the first picture I had.

2. Another was when I had to stay home when my mother had to leave me and teach school for a while. It was late in the fall, and I was looking out of the window and I saw her pass the window and go off to school. (The original of this occurred when he was about three-and-a-half years old.)

3. Next I was playing under a grape-arbor in the back yard at my grandmother's. In throwing things at the little chicks, I accidentally killed one of them. Then I buried it, feeling very sorry over what I had done. (When he was about three-and-a-half or four years old.)

4. Another one was during a very cold winter, when I went up to my grandmother's, and had a long drive with a horse and buggy from the station, about seven miles, and there was a great family reunion. (When he was about seven years old.)

5. Another was a very cold night in Kansas City when we were coming home from a play and got stalled on the street cars because the snow was so heavy. (When he was about nine years old.)

6. Another was of fishing for small gray-fish in a little slough in a park in Kansas City. (At the age of nine.)

7. Another was when I was on a journey, and my folks told me that we were coming to California. I thought we were going from Kansas City to somewhere else in Kansas. It was when we were out some distance. I remember the isolated group in the stationhouse when they told me where we were going. (At the age of nine.)

8. Another was when I was cutting some wood in the back yard in El Paso, Texas, after I had left California. It was a very clear moonlight night. It happened that at this time I was wondering what I was going to do some five or ten years later. It was just like I was there again. I cut the wood, and distinctly saw the moonlight, the axe, and the block again. (At the age of eleven.)

9. Another was very distinct. It happened just a year before I went into the service. I went up here to Lake Tahoe with a party. We arrived about twelve o'clock, Sunday night, having come over a foot and a half of snow at the summit. There was hoar-frost all over the rocks, and ice on the edge of the lake. [Then follows in minute detail an account of swimming in the icy lake at midnight, as the result of a "dare."] I was doing it again; I felt the cold air, and saw the hoar-frost. [48-50]

The aviator's experience can be paralleled by that of others who have reported re-living their past while constructively meeting a serious crisis. In an emotional situation the individual is stirred not only to swift adaptive action but also to a lightning chain of thought. There is a consideration of the present problem, of the prospects that one or another course of action will succeed, and at the same time a detailed recollection of the past. The chain of memories from the past really indicates a temporary dissociation of the thought processes. (Possibly, temporary dissociation should be added to the foregoing list of signs of emotional disturbance.)

A second illustration of emotional excitement during a time of danger, also described by Stratton (1928), is that of a fire which might easily have turned into a real tragedy. The details, as dictated by Dr. William E. Ritter on the day of the accident, are given below:

On the morning of February 3, 1922, a near tragedy by fire occurred in my household. A short time before breakfast, while I was sitting alone in the dining-room before an open fireplace, my little niece, six years old, Alice W., came downstairs ahead of her mother and father and the other members of the family, took her place in front of the fire with her back toward it, and began talking to me. Her night garments were still on, and over these a morning dressing-gown of flannelette (cotton with a nap-covered surface) that reached nearly to the floor. Getting a little too near the fire, without an instant's warning the whole back of her outer garment was enveloped in flame.

Alice was within easy arm's reach of me and my first recognition of what was going on consisted in seeing the flame over her shoulder and hearing a little outcry by her. At the very instant, so far as I can tell, of my awareness of what was happening, there was before my mind the case of a terrible

burning of one of my own sisters which occurred while I was an infant, and concerning which I consequently had only indirect knowledge. The burn left my sister badly scarred for life, and the event was epochal for the entire family. "The summer Ella was burned" was a more-or-less cardinal date of reference for many of the incidents in the family history.

Along with this memory-picture stood the picture of the little B. girl. This case happened in La Jolla some six or seven years ago and, although outside my own family connections, it was within my circle of acquaintances and I had considerable knowledge about it. The little girl, considerably younger than Alice, was clothed in much the same way, at least so far as the outer garment was concerned. The fire caught, in her case, from the flame of a coal-oil stove, but the spread of it was apparently much like that which I was here witnessing. . . .

But with all the rest there was the automatic impulse to action. To throw down the paper I was reading, to spring to my feet, and to grasp the girl with both hands were acts quite independent, so far as I can tell, of thought directed to them. But thought as to what course to pursue came almost simultaneously with the initial perception and actions. Four main alternative possibilities presented themselves together, so far as I can tell: smother the flame within the garment itself; smother it in a blanket or something similar; pull off the garment; or flood the whole with water.

As to the choice between these four courses: Smothering the flame within the garment, being the most immediate possibility, was tried at first. But an instant of effort showed its futility. No blanket or anything suitable for smothering was available without leaving the room (the possibility of using a small floor rug that was within reach did not occur to me until later, but it seems now that the stiffness and heaviness of the rug and its inadequacy in size would probably have made this alternative less effective than the one pursued). As for extinguishment with water, the chances, though something, were so remote that it was given no great consideration. The only chance was a faucet in the kitchen which meant passing through a door and carrying Alice at the same time, as there was no one to open the door; and obviously the flame was doing its deadly work so rapidly that there was little promise in this direction.

Consequently, the fourth alternative, that of stripping off the flaming garment was settled upon as offering the greatest chance of success. Alice's outcry and effort to protect her face by throwing up her arms and diving her face down on her chest and under her arms was an instantaneous reminder of the danger of inhaling the flame. Consequently to help her instinctive action in this was part and parcel of the task in hand. My whole action-system operated to the two-fold end of keeping the flame from her face and getting the garment off by stripping it over her head. Such a thing as unbuttoning and removing it in the usual fashion was obviously out of the question. To strip it over the head and by main force pull it loose from the body was the

only thing. This was accomplished with, however, more hard jerking and hauling than were really necessary. The flaming garment was torn off and thrown into the fireplace to prevent its setting the house on fire, with no burns on Alice except some singeing of her hair. This fortunate outcome was undoubtedly largely due to the fact that she had on a woolen union-suit under her gown. Except for this the body would have certainly been severely burned. The immunity of the face and mouth was attributed mainly to her own instinctive protective responses, but partly to my effort to keep the front of the garment, which was less enveloped in flame, as close as possible to her face while pulling it off.

But in connection with this part of the situation, a new and terrible thought came to me. Alice's outcries largely subsided toward the end of the struggle; and the query, "Has she actually breathed in the deadly flame?" gave me an instant of dreadful suspense. But this was only momentary, for she scrambled to her feet from the floor where my hard treatment had thrown her, and was ready to run to mother and father—clearly unhurt. The sense of relief at such an issue of such an event is great indeed! . . .

Along with the contents of consciousness already described was the question of assistance.

My vocalization was, I am aware, fairly vigorous but almost involuntary and aimless. Whether I uttered any definite call words I am unable to say positively. My impression is that I did not.

The thought of help certainly came into my mind—particularly help in the way of holding Alice so that I might have something to pull against in tearing off the garment. The father naturally came forward most distinctly in this connection, but the mother and Mrs. Ritter were also dimly present in my thought, as were the two members of the household in the kitchen preparing breakfast.

I am quite sure now, as I think back over the affair, that the rapid spread of the flame and the distance away of father and mother, with closed doors intervening, influenced me against spending time or effort trying to get help. Vaguely my thought was, essentially, "yourself alone or disaster."

As for myself, there was undoubtedly an element in consciousness of hands being burned, but undoubtedly this element occupied only a very minor place in the total of consciousness. This seems to me a significant fact. I cannot now recognize that there was any particular thought of disregarding injury. Sense of pain from the burning was very slight. In fact it amounted to scarcely more than the consciousness that one has of his hands when he is vigorously using them in any ordinary performance. I am quite sure that there did not come to me the thought that very likely my hands were being burned more than I appreciated, but of course there was no possibility of taking this into account as long as there was serious work to be done. The dominant element of consciousness, I am quite sure, while the whole activation system was in operation, was to complete the job. . . .

Another interesting fact connected with the pain is the slowness, previously referred to, with which it became established in consciousness. . . . [352-355]

These two illustrations show that in times of danger the individual can act in a well-integrated manner. The thought processes move much more rapidly than under normal conditions. Ideas and possible courses of action occur to the subject in great number; some are accepted and others rejected. This process of sifting goes on with almost lightning rapidity at the same time that the excited individual is carrying out some course of action.

From such illustrations it can be argued that emotional excitement may be of great service to the organism. This interpretation agrees with that of Cannon, who has emphasized the fact that the bodily changes of emotion prepare the organism for vigorous and sustained action in the face of an emergency.

On the other hand, Stratton's examples clearly indicate a certain degree of mental dissociation during great excitement. The aviator's thoughts of childhood, reviewed so rapidly during the crisis in the air, had no conceivable utility in meeting the emergency. Similarly, in the second illustration, Dr. Ritter was recalling many useless details of past fires.

The truth seems to be that in great excitement there is excessive mental activity and that thoughts arise which may or may not be serviceable in the face of danger.

Is emotion always disruptive? The answer is obviously a matter of definition, for if we define emotion as a disruptive state, it is just that. But no definition can obscure the fact that highly excited behavior contains integrated, adaptive components.

Purposive Behavior and Emotional Disturbance. Is emotion an integrated, adaptive activity or is it a state of disruption and turbulence which by its very nature is disorganized, non-adaptive?

In considering this problem, it is necessary to distinguish between two forms of integrated, adaptive activity, each of which has at times been identified with emotion. The first form is the *reflexive pattern of response*. As with the simple reflex, such as a sneeze or the winking of the eye when an insect approaches, so with the more complex reflexive patterns of response, the reaction to stimulation is instant-

neous, dependable, mechanically uniform, and predictable. Examples of general reflexive patterns of response are stretching and yawning, bodily contractions during pain, the startle pattern, the rage pattern (Plate VIII, page 237), copulatory patterns, smiling, laughing, and crying. Observing these patterns as they arise in emotional behavior, some physiologists and psychologists have defined an emotion simply as a reflexive pattern of response, but this is too limited a conception of emotion. In Chapter VI the main emotional patterns of response are described, and the pattern-response theory of emotion is considered in detail.¹

The second form of adaptive activity is *persistent purposive behavior*. Purposive behavior is more variable, less predictable than reflexive patterns of response, and the course of purposive behavior is controlled more by the external circumstances and suited to them. To illustrate: A dog when chasing a rabbit may jump a fence, swim a stream, dash across an open field, sniff at a hole in the ground, throughout the entire course of his behavior following the ever-changing path of the rabbit. The environmental situation controls purposive behavior.

Tolman (1923), in describing the persistent purposive behavior which arises during emotion, has stressed the situation-response relationship. It is not the stimulus-situation *as such*, he writes, or the response *as such* which can serve to define emotion. Rather it is the response as affecting or calculated to affect the stimulus-situation. Thus, in fear it is escape from the stimulus-object, in anger the destruction of it, and in love the encouragement or enticement of the stimulus-object which objectively characterize the specific emotions. It is the "response-as-back-acting-upon-the-stimulus" which distinguishes emotion as such. In other words, each emotion is characterized by a tendency toward its own particular type of adaptive behavior.

In using reflexive patterns of response or persistent purposive activity as criteria of emotional behavior one emphasizes the adaptive, integrative aspect of the total process. Opposed to these descriptions of emotion is another which affirms that an emotion is a *state of disturbance or disruption*.

¹ Landis and Hunt (1939), in their clear analysis of the startle pattern, have given us an excellent example of what can and should be done in the study of reflexive patterns of response.

Actually, integrated activity and varying degrees of disorganization in behavior exist side by side within the same emotional episode. At any given time emotional behavior is more or less disturbed. Emotional behavior may be disturbed in some respects and not others. Thus, while a man is fighting (goal-oriented behavior), he may talk incoherently, stammer, and make a good many slashing movements with his arms (disorganized behavior).

The degree of disturbance entering into emotional behavior varies between two extremes. To begin with, there are non-disturbed, non-affective activities including walking, swinging one's watch fob, knitting, etc.; these activities represent the zero point of emotional disturbance; they are non-emotional. Then there are mildly affective processes—the small annoyances and satisfactions of the day. With each of these processes there is at least a modicum of affective disturbance, if not actually an emotional one. At the other extreme are the most violent outbursts of passion which the individual can manifest, such as those designated by the words: *rage, terror, horror, agony, great excitement, ecstasy, grief, disgust, shame, embarrassment, jealousy*. In intense emotional seizures like these there is a high degree of disruption of the integrated processes; this disruption is revealed in conscious experience, in behavior, and through profound internal bodily changes. Between the extremes of a mild affective process, on the one hand, and violent disintegrating passion, on the other, are all gradations in the degree and extent of disturbance. (See the illustration on page 199.)

In support of the view that an emotion is a particular kind of disturbance rather than an integrated, adaptive activity, we present the following arguments:

1. *Any purposive activity may run its course with or without signs of emotional disturbance.* Fighting an enemy, running a race for one's life, and mating have a fair claim to the title of "purposive emotional activity." These activities have been evolved to aid the preservation of self and of race. They occur at a high level of energy expenditure and excitement. They are ordinarily emotional in the sense that they are more or less disturbing to the individual. Yet any one of these patterns of behavior—fighting, fleeing, copulating—may occur, under other circumstances, non-emotionally. To illustrate, in a prize fight the champion is likely to lose the contest if he becomes

angry; emotional fighting is less skillful than that which is calm and poised. Again, an escape from prison may be carefully planned and calmly executed; to the extent that the emotion of fear is present, the activities of flight are hampered and likely to fail. Finally, the copulatory act, if habituated and free from interference, may occur with little sign of emotional disorganization; it may occur in just as matter of fact a way as the normal processes of food ingestion.

2. *Frustration of a purposive activity or success in making a goal-response, if the individual is highly motivated, produces an affective state.* If the emergency reaction is aroused and then blocked—as when a man is angered but restrained by social considerations from striking the offender, or when a tiger is energized to flee from a burning forest but finds no escape—then, despite the physiological energizing processes, the behavior becomes disorganized, emotional.

A child becomes angry when frustrated; if anger does not bring him what he wants, he is still further frustrated and may go into a rage. If his parents (lacking psychological insight) give him what he wants to stop the screaming, his emotional behavior may acquire a certain utility for him. Now let us assume that the parents are advised by a psychologist to put a stop to the temper tantrums. The next time the child becomes angered, the parents assume an attitude of indifference. This indifference further frustrates the child. He screams, turns red, goes into a rage. The tantrum lasts for several minutes, perhaps for an hour. Finally the child quiets down, having lost a major battle in life and gained an important lesson. In this instance the parents at first actually encouraged the development of anger by allowing the child to gain his ends through an emotional display. When the rules of the game were changed and a temper tantrum was no longer effective, the unaccustomed parental indifference brought about further frustration, and an increase of anger in the child's behavior.

In general, the more highly an individual is motivated and the more completely and definitely he is frustrated, the greater will be his emotion. This is true for any given purposive activity, such as fighting, a flight for one's life, pursuing a mate. If the activity in progress is blocked, an emotional disturbance occurs.

In addition to frustration of purposive activity, the sudden making of a goal response will also bring an affective state. "Weeping for joy"

is a familiar illustration of this. From the subjective standpoint, it may be said that the sudden satisfaction of a desire, the quick relief of mental tension, and complete success in reaching a goal induce *pleasant* affective states.

These facts justify us in distinguishing between purposive activity, on the one hand, and emotional disturbance, on the other.

3. *There is no sound criterion for distinguishing some purposive acts as emotional and others as non-emotional other than the element of disturbance or disorganization which accompanies the act.* It is commonly recognized that anger is associated with an impulse to attack and fear with an impulse to escape; but if we equate anger with attack, fear with escape, we run into difficulties of definition. As we have seen above, there are calm, non-affective forms of attack and escape as well as emotional forms.

4. Finally, there is an *argument from convenience and simplicity of definition*. We already have a psychology of motivation which takes account of purposive behavior. Psychologists employ such terms as *goal-oriented behavior*, *drive*, *appetite* and *aversion*, *adient* and *abient response*, *determining set*, *activity level*, and *energy release* to describe the important aspects of purposive activity. If the word *emotion* were just another term to designate some special kind of purposive activity, there would really be no need for the term; it might as well be dropped from the psychological vocabulary, as some psychologists have proposed.

On the other hand, psychologists agree that, during emotion, disorganized behavior and confused conscious experiences exist. There is no other word than *emotion* which adequately labels these acutely disturbed states and there is no real gain in selecting another term to designate them. Criteria for distinguishing emotional disturbances from other forms of psychological disorganization are given later.

Confusion arises from the fact that purposive behavior and emotional turbulence occur simultaneously. In fact, it is difficult, if not impossible, to find an instance of emotional upset which is entirely free from elements of adaptive, patterned response. Moreover, psychologists and laymen alike have differentiated emotions on the basis of the organized behavior which an emotionally excited organism exhibits. For example, fear has been distinguished from anger on the ground that in fear there is an impulse to escape and in anger an

impulse to attack. Beyond doubt, then, the term *emotion* commonly designates a process in which both organized and disorganized elements exist side by side. When, for example, Goodenough points out that retaliative behavior becomes more and more frequent as the age of the child advances (page 193), she is describing the development of anger in terms of purposive elements in behavior.

In the psychology of everyday life, emotion is popularly thought of as a state of disruption associated with some purposive activity—a twofold process. Thus, anger is thought of as a disturbed affective state *plus* an attack (or impulse to attack) whatever frustrates. Fear is regarded as a disrupted state *plus* an attempt to escape from danger or to protect one's self. In the usual conception of tenderness are included movements of fondling and caressing. In sexual emotion there is overt sexual advance. In disgust there is a movement to reject some foul or slimy object.

It is true that many types of emotional behavior—the majority, perhaps—are characterized by some purposive action or impulse to act. It is also true that there are emotions which are wholly disruptive, evidencing no purposive activity. Some of these are: general excitement, grief, amusement, agony. Instead of purposive activity, these emotions are characterized by such non-adaptive behavior patterns as aimless movement, weeping, laughter, writhing.

Since disruptive behavior and purposive activity are usually associated, it is convenient to consider the adaptive and disruptive aspects together. The term *emotional behavior* will be used to designate the total behavior which, from one point of view, appears as purposive and, from another point of view, as a disturbed state. The word *emotion*, on the other hand, is used to designate an acute state of disturbance of the individual as a whole regardless of the way in which it is revealed.

Organization and Disorganization in Emotional Behavior. We have repeatedly referred, in the past few pages, to integrated or organized behavior and disintegrated or disorganized. It is necessary now to explain that one's total psychological state may be more or less disorganized and that at the same time certain components of the behavior, certain reflexive patterns within it, may continue to be integrated or organized. One, for example, on walking through a cemetery at night, may be trembling and cold with fright, with knees

knocking together and consciousness a blur; yet the wink reflex will still occur if an object suddenly approaches the eye. The feet can still be placed one before the other to escape from the frightening place. Though too terrified to speak aloud, the person can still articulate whispered monosyllables to an equally frightened companion.

To state a very simple analogy: A large mosaic pattern can be broken up, as in removing the tile floor from a building, for example, and yet in the broken pieces many perfect individual units of the pattern may remain intact.

In states of emotional disorganization it is the higher, complexer levels of total activity—those controlled by the cerebral cortex—which are first disrupted. Skilled motor activities requiring precision and control of movement, constructive thinking and difficult discrimination, come in this category. Integration still exists on the lower, less complex levels of activity, which are subcortically controlled. Here we have simple reflexive patterns of response, such as walking, jumping, crying, and internal visceral reflexes. In states of emotional disorganization, also, well-learned habitual actions persist. The individual is still able to utter words, manipulate a tool, and perform other acquired actions.

Illustrations showing the relationship between organization and disorganization in emotional behavior can be found everywhere in life. Suppose, for example, that a machinist is smoothly operating a complicated instrument when his boss reproves him. The machinist blushes, waves his arms in the air, shrugs his shoulders, swears if he dares to; he becomes angered. His smooth activity is completely disrupted; the excessive movements and internal bodily changes of emotion have little direct relation to his formerly integrated behavior. Again, a child is smoothly studying his arithmetic lesson when his mother says, "When you finish your lesson, we'll go for a picnic." The joyful child claps his hands and jumps up and down. The former smooth activity is disorganized by the remark, and excessive, non-adjustive movements take its place.

In these examples, a non-emotional, organized activity becomes emotionally disorganized. But even though the total activity is disorganized there appear components of emotional behavior which are well integrated. The arm waving and swearing of the machinist are integrated processes, at least from the physiological point of view,

and the blushing indicates a general integrated response of vasodilation. Similarly, the hand clapping and jumping of the joyful child are integrated processes; in each component movement the extensor and flexor muscles act together to produce a unitary response.

Complete disorganization of behavior exists only in profound unconsciousness, coma, and death. If the organism can respond at all to stimulation, he reveals some degree of organization in his response.

Organization and *disorganization*, therefore, are relative terms. The degree of organization which exists in behavior at any time is variable. There are all gradations from the maximal degree of organization to complete disorganization. As a matter of logic, these terms are opposed. The higher the degree of organization, the lower the degree of disorganization, and vice versa.

Emotional behavior is more or less disorganized. The total integrated process of behavior may be disrupted, but the components of emotional behavior are integrated, organized.

BY WHAT CRITERIA CAN EMOTION BE DEFINED?

If one accepts the view that an emotion is a *disturbed state* of the organism which is revealed in various ways—in behavior, in conscious experience, through internal bodily changes—one must ask: *By what criteria can this disturbance be recognized and distinguished from non-emotional states?*

There are a number of criteria which can be used for differentiating emotional from non-emotional states. These will be considered in the sections below. It should be said in advance that no *one* of the criteria to be listed, when considered by itself alone, is fully adequate to define the concept of emotion. Instead of selecting a single criterion, therefore, we shall select three essential characteristics of emotion. When these three criteria are met simultaneously, the process under consideration *is* an emotional one.

The criteria are: (1) An emotion is a disturbed state of the organism. (2) An emotion includes visceral changes due to increased activity of the autonomic nervous system. (3) An emotion originates within the *psychological* situation. In the following sections we shall consider these criteria.

Emotion as a Disturbance or Upset. In the foregoing pages the position has been taken that an emotion is an acute disturbance

of the organism which is revealed in behavior, in conscious experience, and in diverse physiological processes.

This position is held by many competent psychologists. An apt illustration of this view is given by Howard (1928). To bring out his point he uses the case of a man unexpectedly meeting a bear in the woods. "In the disruptive state called emotional the victim can be said, in one sense, 'not to know what to do.' The bear is too much for him. He has no ready-made responses to draw upon, and too little resource in the way of reaction patterns to enable a reconstitutive process to build up an appropriate response. From another point of view the victim can be said to think of too many things to do. For, upon sight of the bear, he tends simultaneously to yell, to climb a tree, to run away, to throw a stone, to grasp a club, and what not. All of these impulses seek motor expression, get jammed in the process, and the result is a state of discoördination. Accompanying this disruptive condition we have those strange visceral and vegetative phenomena commonly recognized as characteristic of the emotional condition."

Also emphasizing the disruptive nature of the emotional state, Claparède (1928) wrote: "Emotions occur precisely when adaptation is hindered for any reason whatever. The man who can run away does not have the emotion of fear. Fear occurs only when flight is impossible. Anger is displayed only when one cannot strike his enemy. . . . The uselessness, or even the harmfulness of emotion, is known to everyone. Here is an individual who would cross a street; if he is afraid of automobiles, he loses his composure and is run over. Sorrow, joy, anger, by enfeebling attention or judgment, often make us commit regrettable acts. In brief, the individual, in the grip of an emotion 'loses his head.'"

Watson (1929), who has emphasized the view that an emotion is a pattern of response which can be conditioned and reconditioned, wrote: "There would seem to be no question, but that the immediate effect of the exciting stimuli upon organized activity . . . is always disruptive. If an individual is preparing a lecture or writing a book or rendering a musical selection, any strong emotional stimulus at least temporarily disrupts and blocks the organized activity."

Dockeray, in the 1936 edition of his *General psychology*, discussed the topic of emotion under the heading of Disorganized

Response and contrasted organized and disorganized (emotional) behavior.

Morey (1940) has identified emotion with bodily upset and has distinguished between integrated behavior and upset. The contrast is illustrated by what we commonly call love. The condition of being in love may be an emotion (upset) or a highly integrated, intelligent reaction. "To avoid upset," Morey continues, "people can be taught how to make love gracefully, as the Loma teach their children in the bush school as soon as they reach puberty, with the result that Loma men and women are seldom upset by love situations."

Although disturbance of the individual is a *necessary* condition of emotion as here defined, taken alone it is not a *sufficient* criterion for differentiating it. One difficulty with the definition of emotion as a disturbed or upset state is that one cannot always, on superficial observation, determine whether such upset exists. An example of this has been cited by Morey. He writes:

Upset of physiological processes is provoked by numerous sets of forces. Emotions are as numerous, therefore, as the sets of forces that elicit upset. Patterns of forces eliciting upset differ from one group of people to another, and vary with the past experience of the subject on which such forces play. A set of forces will elicit upset in some people and smooth responses in others. This is doubtless the reason that some people judge a situation to be emotional whereas others judge it to be non-emotional.

For example, six years ago a climber set out from a Swiss mountain hut at 3 A. M. to climb the Matterhorn. He was alone, cold, and half asleep. Less than 100 yards from the comfortable safety of the hut, he had to climb an overhang of rock. Foot- and hand-holds suddenly could not be found.

The climber was cold. He seemed unable to concentrate his activities; his attention swerved from essential details. His strong wish and tendency to move quickly up the mountain was blocked. He experienced bodily upset, and for a moment was unintegrated, emotional. If asked, he would have said he was afraid. This fear might appear at first to be something inside him. Fear, however, was present only insofar as an essential combination of two conditions was present: upset inside the climber and a situation which is thought to be conducive to upset.

Later in the day, when the climber's blood was circulating freely, he concentrated wholeheartedly on each successive movement. His responses were well integrated and harmonious as he climbed up and down places much more difficult than the one that had stirred upset within him when he was cold.

A few times at the top of cliffs he hesitated, and looked out at the sun

playing on the glaciers of the neighboring mountains. An observer, who was watching through a telescope, said, "*He seems to be afraid. He'll turn back now.*" The observer was referring to the situation in which the climber found himself, not to a particular pattern of invisible physiological processes inside the climber. The situation together with the climber's hesitation meant to the observer, fear. It was a fearful situation and hesitation at a critical point might be a sign of upset, which would have been precipitated if the climber's deep-seated wish to climb to the very tip of the summit had been blocked by an impassable cliff.

To the observer, hesitancy on the edge of a precarious cliff meant block of integrated climbing responses entailing upset. To the climber, hesitancy on the edge of this cliff meant a moment's rest for a fine view. The observer judged all of the factors visible to mean fear; the climber was completely integrated, however. The same items were judged by one observer to be emotion, by another to be non-emotion. Such misinterpretation of signs indicating upset are common. Judges interpret these signs by referring to their past experiences, which differ from group to group, person to person, and differ in the same person at different times. [344-346]

It is clear that conditions of disturbance, disruption, upset, may occur in other than emotional situations. To illustrate, if the telephone rings when one is writing a letter, one stops to answer. The process of writing is wholly disrupted (at least for the moment) by the phone call; yet this disturbance of behavior is not an emotion. Again, if a man is lost in a strange city, he may roam about the streets, quite unperturbed, asking questions of pedestrians. He is definitely disoriented but the disturbance of his activity is not necessarily an emotional one.

If one attempts to recognize emotional disturbances by the presence of excessive movements, one may be led astray by the excessive movements in various nervous and mental disorders. Thus, tics and convulsions are present in Saint Vitus dance (chorea), in hysteria, in epilepsy, in certain neuroses, etc. Technically, pathological conditions are not emotional in character, although to the inexperienced observer some of them look like emotional disturbances.

Clearly, then, one cannot claim that all disturbed states are emotions. The concept of disturbance is broader than that of emotion. We postulate, however, that all emotions are states of disturbance or upset. Since *disturbance* alone is not fully adequate as a distinguishing characteristic of emotion, we must seek other criteria to delimit the concept. A second criterion follows.

Visceral Processes in Emotion. An outstanding characteristic of every emotional state is the presence of profound and widespread visceral changes (in smooth muscles, glands, heart, and lungs) due to increased activity of the autonomic nervous system. Secretion of sweat, flow of tears, inhibition of saliva, a wildly beating heart, irregular respiration, dilation of the pupils, erection of the hair, frequency of urination, pallor or flushing of the face—these are only a few of the many externally observable signs of internal bodily changes in emotion.

But changes in visceral processes appear also in calm, undisturbed behavior. If, for example, a man is fatigued and overheated by hard work, or if he is in a room which is too hot, secretion of the sweat glands is increased. Vigorous exercise is associated with quickened heartbeat, deeper respiration, increase in adrenal secretion, and other bodily changes which regulate energy expenditure. In hunger the smooth muscle fibers of the stomach wall contract, giving the painful hunger pang which is spoken of as a *feeling* or *appetite*, not as an emotion. Similarly there are visceral changes associated with all the basic needs of the body—the needs for water, sleep, elimination, etc.

Again, in pregnancy and in various diseased or otherwise abnormal bodily conditions, there may be marked changes in the vegetative processes (functioning of smooth muscles and glands). One can legitimately argue that an attack of pneumonia or some other serious illness is a *disturbed* state of the organism which profoundly involves the vegetative processes. Yet neither physician nor psychologist would designate such a condition as an emotion.

Clearly, therefore, the appearance of a well-marked change in visceral functioning cannot by itself serve as an adequate criterion for defining emotion. What additional criterion is needed?

The Psychological Origin of Emotion We have seen that emotion is a disturbed state of the whole individual and that it is characterized by marked internal bodily changes. The third criterion of emotion relates to its origin: every emotion arises within a psychological situation.

When we say that an emotion has a psychological origin we mean that the emotional disturbance arises from the psychological relationship existing between the environment and the organism. Objectively considered, this is a stimulus-response relationship. The environment

stimulates the organism and the organism in turn responds to the stimulating environment. A psychological situation is not in the environment alone or in the organism alone, but it is a totality of environment and organism in a stimulus-response relationship.

The traditional textbook sources of emotion—meeting a bear in the woods, being called upon to speak extemporaneously, receiving an insult, finding a foul object, seeing one's lover—invariably portray a total situation which contains both an environmental factor and a responding organism.

If a burglar, having gained entrance into a house in the night, suddenly confronts the householder with a gun, the householder will probably tremble and sweat; his breathing will become labored, and his speech difficult. These are signs of the visceral changes occurring in emotion. Objectively, the origin of the man's emotion is obviously in the psychological situation, a stimulus-response relationship between the environment (burglar and gun), on the one hand, and the organism (householder), on the other.

From the standpoint of the individual who experiences an emotion, the inducing situation consists not only of perceived objects, events, and relationships within the external world but also of the bodily self experienced as directly related to these objects, events, and external relationships. Thus, referring again to the householder who is confronted with a burglar, not only is the frightened man aware of the intruder with his pointed revolver and of himself-as-about-to-be-shot-by-the-pointing-gun but also he is aware of his own cold sweat, trembling muscles, palpitating heart, dry mouth, and difficulty in speech. The experienced emotion is inextricably bound up with the inducing situation.

From the subjective point of view, a further aspect of the psychological situation appears. An emotional situation may evoke memories and thoughts, as it did in the above-mentioned case of Dr. Ritter, who recalled previous tragic fires while saving his young niece from burning to death and at the same time considering the merits of various ways of putting out the fire. Such memories and thoughts become a part of the total psychological situation and play their rôle in inducing emotion.

During reverie, emotions sometimes arise from recalling previous unpleasant or pleasant experiences or from anticipating future events.

Such emotions appear to originate wholly from within the organism, but actually they are dependent upon the re-living of an environmental situation of the past which has left its marks upon the individual.

The psychological situation, subjectively considered, is further complicated by the process known as identification. When a man reads a story, he puts himself imaginatively in the place of the hero or other characters. With this more or less unconscious identification, the reader experiences joy or grief, fear or anger, love or hate, as the plot unfolds. Similarly, in the experiences of everyday life, one frequently identifies himself with persons about him whose emotional episodes he happens to witness or hear about. The process of identification makes it possible for the individual to increase the range or scope of his affective life, to experience a wider variety of feelings and emotions than he otherwise would.

Thus, through memory and anticipation and through the process of identification, the present psychological situation is modified by the past experiences of the individual.

Other Possible Criteria of Emotion. In addition to the above three criteria there are at least two other characteristics of emotion which must be presented in order to complete the picture. These are briefly considered below as possible criteria of emotion.

One of these characteristics is the *weakening or loss of cerebral control*. During calm, non-emotional behavior the organism usually functions as a unit, the cerebral hemispheres dominating activity of the lower neural centers. During excitement, conflict, frustration, or sudden release of tension, however, the cerebral control is weakened or temporarily lost. When this occurs, the reflexive response patterns which are integrated on the subcortical level partially or wholly dominate behavior. The individual may laugh or cry, show rage, startle, disgust, or some other pattern. The appearance in behavior of some reflexive response pattern which is integrated on the level of the midbrain, and below, may serve as an index of the loss of cerebral dominance. The loss or reduction of cerebral dominance has been considered as a criterion of emotion. A practical difficulty, however, is the fact that such loss of control is not directly observable but has to be assumed on the basis of the response patterns which are observed. A second difficulty is that a loss of cerebral

control occurs in some states other than emotion, as in sneezing and coughing.

Another possible criterion of emotion is a *marked change in the level of general activity*. In excited, energizing emotions the activity level rises markedly. The individual makes excessive, aimless movements in great excitement, rage, fear, pain, injury. Such excessive activity occurs also in joy. Sometimes in fear there is a complete paralysis of action instead of heightened activity. And in grief, as well as in other depressive states, the level of general activity is low.

One difficulty with using the change in activity level as a criterion of emotion lies in the fact that the activity level also changes with a variety of non-emotional states. In fatigue, sleepiness, and in many illnesses, the activity level drops; in vigorous health and a well-rested condition, and in certain diseases, the activity level rises.

The Definition of Emotion. The above discussion has shown that no one criterion is sufficient to define the concept of emotion. Three criteria have been found necessary to distinguish emotional from non-emotional processes: (1) an acute disturbance or upset which is revealed through changes in behavior and in conscious experience; (2) widespread bodily changes in the action of smooth muscles, heart, and glands, which (we now add) indicate a marked involvement of the autonomic nervous system; (3) a psychological (rather than a physicochemical) origin for the whole process.

All three criteria must be met simultaneously for any process to be defined as an emotion. Combining the criteria, therefore, we arrive at this definition: *An emotion is an acute disturbance or upset of the individual which is revealed in behavior and in conscious experience, as well as through widespread changes in the functioning of viscera (smooth muscles, glands, heart, and lungs), and which is initiated by factors within a psychological situation.*

The definition is a bit cumbersome. It can be stated more briefly in this way: *An emotion is an acute disturbance of the individual, psychological in origin, involving behavior, conscious experience, and visceral functioning.*

In view of this definition, the adjective *emotional* should be used with reference to the disturbed aspect of behavior or experience. In all emotional behavior, no matter how completely disorganized it

may be, there is always to be found some element of organized activity—perhaps a reflexive response pattern such as crying, smiling, vomiting, or the startle pattern; perhaps some goal-oriented activity such as striking at an enemy, running from danger, calling the police, pouring water on a fire, stepping on the brakes. In other words, along with the emotional disorganization there is a back kick of organism against environment; the organism does something about the situation. This integrated component of emotional behavior must be kept constantly in view, but the term *emotional* is not necessary for the description of the integrated activity by itself. This term is correctly used only when the disturbed aspect of emotional behavior is included. The integrated aspect of emotional behavior, however, is always of interest and importance to the psychologists.

The Individual. The above definition of emotion contains the phrase “an acute disturbance or upset of the individual.” A brief explanation of this phrase and of why it is so worded in the definition should be given.

This type of definition does not restrict the process of emotion to behavior or to conscious experience or to internal bodily changes. Rather, all these are assumed to be aspects or phases of a single emotional event. An emotion is an acutely disturbed state of the individual as a whole. This disturbance is normally revealed in: (1) the individual's conscious experience, (2) his behavior, (3) physiological changes, especially in the smooth muscles, glands, heart, and lungs. The emphasis throughout the definition is upon the psychological individual.

Further, an emotion was defined as “an acute disturbance or upset,” to distinguish the process from relatively stable states of conflict and of neurosis. It is important to distinguish between emotional upset and neurosis.

A neurosis is a relatively stable or chronic state of disorganization within the psychological individual. The neurotic state is revealed by some special symptom or group of symptoms, among which are: amnesias, tics, tremors, extreme changes in the level of activity, changes in pulse rate and respiration, repeated emotional outbreaks, and other symptoms. An emotion, then, is not at all a neurotic state, but may be one of the manifestations in the course of certain neuroses. The neurosis is of longer duration than the emotion. This is why the

emotion was described as an "acute disturbance," a relatively brief and intense process.

Emotional outbreaks, of course, occur in the daily life of every normal person. One reason for studying emotions is that the study helps us to understand the individual in whose life the emotion arises.

The individual, as psychology reveals him to us, not only manifests emotions, but he discriminates, learns, thinks, desires, and possesses the various attributes which psychological tests and analyses compel us to impute to him. One can approach the study of the individual from a great many directions. In the present book our approach will be through the analysis of feelings, emotions, attitudes and motives.

THE EVALUATION OF EMOTION

The view that emotion is a biologically serviceable activity is definitely a teleological interpretation of behavior. Similarly, the view that emotion is a disturbed state—a disorganization or disruption of behavior—is evaluative; it carries the implication that emotion is an injurious or undesirable process or at best a useless one.

Pure science deals with facts and not with values. Despite this distinction, men of science have been much interested in questions regarding the value of emotional processes.

In the discussion of a paper which was presented by Howard (1928) at the Wittenberg symposium is this question and its answer:

Professor Thompson: Is it not the biological and physiological purpose of emotion to protect the person rather than to confuse him?

Dr. Howard: I have always been interested in that question, as to the value of emotional states, and the conclusion to which I come is that they have absolutely no value at all, but represent a defect in human nature. I cannot see any other conclusion you can come to. [147]

The Utility and Inutility of Emotion. The contrast between the useful and useless components of emotion was clearly drawn in Darwin's (1872) classical work. After collecting and organizing a mass of detailed observations upon emotional states Darwin formulated three principles for interpreting emotional manifestations. The first of these principles stresses the *utility* of the responses which appear during emotional excitement. The second principle (that of

antithesis) does not directly relate to utility and will be considered in another context (page 102). The third principle emphasizes *useless, excessive behavior* in emotion, which can be explained only by reference to the constitution of the nervous system apart from utility.

Darwin was much impressed by the fact that present behavior can be explained by reference to previous responses in the life of the individual or the race. For example, when a horse is eager to start upon a journey he makes the nearest approach he can to the habitual movements of progression by pawing the ground. Such pawing is universally recognized as a sign of eagerness, Darwin states. When horses in their stalls are about to be fed and are anticipating their corn, they paw the pavement or the straw.

In other instances, however, explanation reaches beyond the life span of the individual to the early history of the species. When, to illustrate, a dog prepares to sleep on a carpet or other hard surface, he commonly turns around several times and scratches the ground with his forepaws in a senseless manner. The explanation for this lies in the fact that the wild ancestors of the dog lived upon open grassy plains or in woods where it was necessary to trample down the grass and to scoop out a hollow place before lying down. This vestige of formerly useful behavior still remains, even under circumstances in which it is no longer needed.

Similarly, in emotional behavior the "expressions" may be potentially useful here and now, or perhaps they are vestiges of acts which were serviceable during some earlier stage of evolution. In anger, for example, a man raises the lips and shows the canine teeth even though he does not now intend to bite his opponent. In disgust he registers a facial expression which is the normal response to a foul odor and which, when intensified, is preparatory to actual vomiting.

Following Darwin, the surgeon Crile (1915) has stressed the evolutionary view of emotions. He writes:

When our progenitors came in contact with any exciting element in their environment, action ensued then and there. There was much action—little restraint or emotion. Civilized man is really in auto-captivity. He is subjected to innumerable stimulations, but custom and convention frequently prevent physical action. When these stimulations are sufficiently strong but no action ensues, the reaction constitutes an emotion. A phylogenetic fight is anger; a phylogenetic flight is fear; a phylogenetic copulation is sexual love, and so on

finds in this conception an underlying principle which may be the key to an understanding of the emotions and of certain diseases. [76]

As compared with the entire course of organic evolution, Crile continues to explain, man came down from his arboreal abode and assumed his new rôle of increased domination over the physical world but a moment ago. And now, while sitting at his desk in command of the complicated machinery of civilization, if he fears a business catastrophe, this fear is manifested in physical changes like those his primitive forebears exhibited in the ancestral battle for existence.

Crile points out that man cannot fear intellectually or dispassionately. Whether the situation which endangers him is a struggle for credit, position, and honor, or a physical battle with tooth and claw, he fears with the same vital organs. The inducing situation may be moral, financial, social, or physical, but the responses thereto are a wildly beating heart, accelerated respiration, increased perspiration, pallor, trembling, indigestion, dry mouth, and other components of the augmented sympathico-adrenal discharge.

The impulses to defense and escape are born of innumerable injuries which have been inflicted during countless centuries of organic evolution. When the tooth and claw of an enemy sink deeply into unprotected tissue, the deep-lying receptors are stimulated and reflex avoidance is set up at once. Animals which lack escape patterns are likely to be devoured and, conversely, those best endowed with injury-avoiding mechanisms are the ones most likely to escape and leave offspring. Thus, Crile concludes, the development of injury-avoiding behavior can be explained on Darwinian principles.

The responses of escape and defense, as we observe them in nature, are not reactions to actual injury so much as they are responses to situations which are premonitory of injury or pain. Thus the deer is startled by rustling leaves, by a moving form, or by a strange odor; and he flees before the lion gets his fangs into the flesh. The terrified cat climbs a tree (let us hope!) before the dog catches her. The utility of these activities in protecting the organism is self-evident.

The utility principle has been extended by Cannon and his collaborators (1929) to include the internal bodily changes of emotional excitement. The visceral changes which occur during a biological

emergency mobilize the energies of an organism in preparation for a vigorous fight or a prolonged race for life.

In sharp contrast with this first principle, which Darwin called the principle of serviceable associated habits, is his third one, which emphasizes useless, random components of emotional excitement. Darwin was unable to discover biological utility for many of the so-called "expressions" of emotion. He affirmed that some phases of emotional excitement can be interpreted only in a mechanical way in terms of the constitution of the nervous system. Thus:

When animals suffer from an agony of pain, they generally writhe about with frightful contortions; and those which habitually use their voices utter piercing cries or groans. Almost every muscle of the body is brought into strong action. With man the mouth may be closely compressed, or more commonly the lips are retracted, with the teeth clenched or ground together. There is said to be "gnashing of teeth" in hell; and I have plainly heard the grinding of molar teeth of a cow which was suffering acutely from inflammation of the bowels. The female hippopotamus in the Zoölogical Gardens, when she produced her young, suffered greatly; she incessantly walked about, or rolled on her sides, opening and closing her jaws, and chattering her teeth together. With man the eyes stare wildly as in horrified astonishment, or the brows are heavily contracted. Perspiration bathes the body, and drops trickle down the face. The circulation and respiration are much affected. Hence the nostrils are generally dilated and often quiver; or the breath may be held until the blood stagnates in the purple face. If the agony be severe and prolonged, these signs all change; utter prostration follows, with fainting or convulsions. [69]

In this description of agony are listed many useless, random activities—grinding of the teeth, staring of the eyes, perspiration, changes in circulation, in respiration, etc. According to Darwin, such bodily changes are useless, of no direct service to the animal. Their existence can be explained only in terms of the innate organization of the nervous system. When the nervous system is highly excited, these excessive bodily changes occur.

Useless, excessive activity is present not only in the unpleasant emotions of painful excitement and agony but also in pleasant emotional states. Consider, for example, the useless activities which are present in the emotion of joy. Darwin described some of them in these words:

Under a transport of Joy or of vivid Pleasure, there is a strong tendency to various purposeless movements, and to the utterance of various sounds. We see this in our young children, in their loud laughter, clapping of hands, and jumping for joy; in the bounding and barking of a dog when going out to walk with his master; and in the frisking of a horse when turned out into an open field. Joy quickens the circulation, and this stimulates the brain, which again reacts on the whole body. [75-76]

Thus in emotional upset there are excessive, useless movements.

One final instance of the inutility of the bodily changes of emotion is found in those authentic instances of death from terror. Not long ago a clear example of this was observed by the writer.

A pet rabbit had been reared from birth to maturity in a small cage. Occasionally he had been allowed to play upon a fenced-in lawn. On one such occasion the rabbit escaped under the fence and began to nibble the grass on the other side. A barking dog approached. The rabbit ran to shelter under a spreading, thorny shrub. The dog barked loudly and jumped excitedly about the shrub while the rabbit crouched in an inaccessible place. It was several minutes before the dog could be chased away and the rabbit rescued. Examination of the latter showed that there had been no injury of any kind—no bone broken, no blood shed. Placed in his cage, however, the terrified rabbit crouched quietly in a corner without moving, and in a few hours was dead. It is reasonable to assume that the rabbit, young and healthy but greatly sheltered as a pet, literally died as a consequence of the bodily changes which occurred during the fright and following it. The surgeon Crile, incidentally, has demonstrated that terror produces observable changes within the cells of a rabbit's brain.

Critique of the Utility and Inutility Doctrines. When one attempts to evaluate emotional excitement as useful or useless, certain basic facts must be kept in mind. Utility always means usefulness for some definite end. Utility is relative. An act which is useful from one point of view may be useless or even injurious from another. This is illustrated in the field of surgery. A wounded soldier has to decide whether to let the surgeon amputate his leg or save it and run the risk of losing his life. The amputation may be useful in saving life but most detrimental to the leg! An illustration in the field of psychology is that of the child jumping up and down with delight over the promise of a picnic. He is performing an act that has no use-

fulness from the standpoint of purposive activity but which gives the child a useful energy release.

The so-called expressions of emotion which lack utility in terms of individual survival may be regarded as having *social* utility so far as they are signals to other members of the group. In man, there are facial contortions, gestures, vocalizations; and, in animals, erection of fur or feathers, drawing back (or erection) of the ears—all of which serve to communicate to others the existence of danger. The emotional expressions, in fact, may have developed on account of their utility in controlling the behavior of other members of the social group, as Craig (1922) pointed out in a note extending Darwin's utility principle.

Psychologists and others who have stressed the utility principle in emotion have been at a loss to discover any use for the responses of laughing and weeping. As forms of overt behavior they are useless. On this point Crile (1915) wrote:

Even superficial analysis of the phenomena of both laughter and crying shows them to be without any external motor purpose; the respiratory mechanism is intermittently stimulated and inhibited; and the shoulder and arm muscles, indeed, many muscles of the trunk and extremities are, as far as any external design is concerned, purposelessly contracted and released until the kinetic energy mobilized by excitation is utilized. During this time the facial expression gives the index to the mental state. [102]

Yet, from another standpoint, laughing and weeping are useful so far as they provide an outlet for the bodily tension present in joy and grief. To illustrate, if a mother has anxiously watched the course of a serious illness in her child, while expending the maximal amount of energy caring for him, she may continue in a state of tenseness until the child either recovers or dies. If sudden relief comes, as when the child passes the crisis of pneumonia, the mother will readily smile and laugh; if tired, she may cry. If death occurs, there is a sudden withdrawal of the necessity for further action, and the mother may now cry aloud and even continue to perform various acts which no longer are useful in the physical care of the child.

Outcries and writhing in pain or grief may similarly be interpreted as useful in that they furnish a motor outlet when the organism is highly excited. In a word, many emotional processes may have

physiological utility even when they lack behavioral utility. As we have said, an emotional response which is useless when viewed from one standpoint may be useful when considered from another angle.

Further, internal bodily changes which are biologically useful under certain conditions may be wholly useless under other circumstances. For example, Cannon has stressed the point that the internal bodily changes of excited emotion liberate energy and in other ways prepare the organism for a prolonged fight or flight or for other great muscular exertion. If there were no emotional upset and behavior moved smoothly and uninterruptedly to its goal, these internal bodily changes would be highly useful in supporting the purposive activity. When upset occurs, however, these otherwise useful changes become part of a disturbed state. Thus, the same internal bodily processes may be useful or useless according to the circumstances under which they occur.

Another point in the critique of the utility and inutility doctrines is this: An emotional disturbance which is wholly useless at the time of its occurrence may result in the formation of an attitude or motive which is of definite utility. For example, it is said that Abraham Lincoln, when a youth, saw slaves being sold on the New Orleans market and was so greatly disturbed by the experience that he said, "If ever I have the chance, I will hit that thing hard." The emotional disturbance, while apparently useless at the time of its occurrence, left him with a definite attitude against slavery. Lincoln's later decision to free the slaves was doubtless determined in part by this attitude, resulting from his early emotional experience.

Similarly, one often hears it said that, while under the influence of strong emotion or in its aftermath, great works of art, science, or literature are produced. Despite such statements it is probably true that emotion, as such, does not produce works of art, or anything else. "Emotion," writes Gordon (1937) in a critical essay upon imagination and emotion, "may be essential as the occasion for creative work, but it is never sufficient for its achievement. What emotion does do is to mark a crisis and to challenge us to an analysis of our interests to see why they conflict. To find a way out is the business of imagination—rather, that is what imagination is."

Thus, to regard emotion as useless does not imply that nothing useful can result from it. On the contrary, useful attitudes

and determinations may follow periods of emotional stress and turbulence.

In view of the above considerations, it seems wise to refrain from appraising emotion in terms of utility or inutility and to hold to a matter of fact analysis. This is the scientific approach which, so far as possible, will be followed in the present study.

CONCLUSION

There are two main views concerning the nature of emotional behavior. From one point of view emotional behavior appears as an organized, integrated process; from another, as a state of disturbance or upset within the individual.

There are several variations of the first view. Physiologists are inclined to define an emotion as a *reflexive pattern of response*, such as the rage pattern or the patterns of smiling or crying. Some psychologists describe emotions in terms of the *persistent purposive activities* which appear in emotional behavior, such as fighting, escaping from danger, mating. In the psychology of everyday life, emotions are commonly identified with *attitudes*, such as those of love, hate, fear, resentment, disgust. These attitudes become organized within the developing individual.

The writer defines emotion as an acute disturbance of the individual as a whole, psychological in origin, involving behavior, conscious experience, and visceral functioning.

An emotional disturbance is a complex event revealed piecemeal to the psychologist: In part the emotion is a conscious experience of the individual; in part it is overt behavior; in part it is made up of internal physiological changes. Emotional disturbance is aroused in a psychological situation—the individual and his external world in a dynamic relationship.

The more complete the information which an observer has relating to a particular emotional disturbance, the more consistently can he recognize it and give it the conventional name. Thus, if the only basis for judgment is a still photograph of the face, little can be told beyond the gross difference between joy and sorrow. If the observer sees the total response, hears the outcry, and especially if he is informed about the inducing situation, he can identify and name the emotion more consistently.

Part of the difficulty in identifying, naming, and classifying emotions lies in the fact that most people have learned to enact emotional expressions for purposes of social communication. Moreover, certain gestures and patterns of facial expression become conventional. It is difficult to distinguish between posed social expressions and innate emotional responses.

Emotional behavior is characterized by marked bodily changes in smooth muscles, glands, heart, and lungs. When emotional disruption occurs, these bodily changes are useless or even harmful to adjustment. But if there were no emotional disruption, these same bodily changes would be useful by liberating energy and in other ways by increasing the efficiency of the organism when called upon to act vigorously and persistently in a crisis.

The study of emotional behavior is of practical value because emotional upsets have a definite relation to problems of health, education, personal adjustment, warfare, and other vital matters. For the student of psychology an analysis of emotion is important because it gives him an understanding of the psychological individual who maintains attitudes, who acts, and who from time to time becomes emotionally upset.

Within psychology the topic of *emotion* is related, on the one hand, to *motivation* and, on the other, to *adjustment*.

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READING SUGGESTIONS

A good way to commence the study of emotion is by reading three textbook discussions which present very different views: James (1890), McDougall (1926), and Watson (1929).

Ruckmick (1936) has made an excellent survey of the main results within the traditional psychology of feeling and emotion. His book will be found useful for surveys of special topics and bibliographies, as, for example, those upon the facial expression of emotion and upon the electrodermal response. This is the best general presentation of the entire field known to the writer.

Lund (1939) should be used for general reading and reference. Chapter I is a good summary of current attempts to identify emotion and define the concept; this should be read along with the present chapter. Lund's book is especially valuable for the summaries upon physiological and experimental studies of emotion.

For more intensive and advanced study in physiological and experimental psychology see Bard (1934), Landis (1934), and Symonds (1931). A recent survey of the experimental literature on emotion has been made by Hunt (1941).

The Wittenberg symposium on feelings and emotions, edited by Reymert and by Murchison (1928), is a collection of papers by different psychologists. The book shows well the divergence of opinion and interest in this field of psychology. Especially to be recommended are the chapters by Claparède, Howard, Stratton, Cannon, Bekhterev, and Jørgensen.

Prescott's work (1938) is a coöperative study concerned with emotion in relation to education. The study is suggestive at many points and should be examined by every student of emotion who is also interested in education.

CHAPTER II

ATTITUDES AND MOTIVES, DETERMINANTS OF EMOTION

To gain a clear understanding of the nature of emotional disturbance one must study attitudes and motives since they are the basis of our affective life. This does not mean that an emotion is itself an attitude or a motive, nor that attitudes and motives are emotions. Rather, it means, on the one hand, that attitudes predispose the individual to emotional upsets and, on the other hand, that an emotional disturbance may leave the individual with changed attitudes. Further, emotion arises from the play and interplay of motives—from conflicts, frustrations, and satisfactions of motives.

To the layman the term *emotion* is often used to designate an attitude such as love or hate, resentment, prejudice, and attitudes of liking or disliking persons. The same words are often employed to designate both emotions and attitudes. Thus, there is an *emotion* of fear which is manifest when one meets a snake in the woods and a fear-of-snakes *attitude* which may be latent for months or even years without any overt manifestation. Again, there is an *emotion* of disgust which is brought out by the sight and smell of decaying flesh and an *attitude* of disgust which may be latent for long periods of time.

An emotion is an acutely disturbed state of the individual. An attitude is a more lasting and stable condition, a predisposition to respond—sometimes emotionally, sometimes non-emotionally. A state of emotional turbulence is psychologically distinct from the attitudes and motives which underlie it.

An attitude¹ can best be described as a neural readiness or pre-

¹ It is interesting to note that the two psychological terms *attitude* and *aptitude* have been derived from the same basic root: *aptus*, meaning fit or fitted. Originally the term *attitude* was a technical term in the fine arts, being substituted for the earlier *aptitude*. In the original sense *attitude* designated a "disposition" of a figure in statuary or painting and hence the posture which was given to it. Today the term *attitude* may refer to a posture which is assumed by the individual, deliberately or habitually. This posture or set may be bodily or mental. (On the terms *attitude* and *aptitude* see: J. A. H. Murray, *A new English dictionary on historical principles*, etc., 1888.)

disposition within the individual to respond in a particular way toward some object or external situation. Characteristically, this response is either positive or negative. Thus, if my attitude toward the Chinese people is positive, I tend to respond in a friendly, approving manner to Chinese students on the campus. If my attitude is negative, I tend to shun their company and to make disparaging remarks about them.

Attitudes are latent neural organizations except when they are called into action (activated) by stimulating situations (motives). When attitudes are latent they are wholly inert (non-motivating); but if activated, they become motivating. At such times they regulate or direct the course of behavior. This is their essential characteristic. They may be regarded as motivators of behavior, not in the sense of initiating activity (as motives do), but by guiding activity into certain specific channels, as the curve in a railway track directs the course of the locomotive through space. For example, the reader's attitudes toward peace and war, the church, the Chinese, the Republican Party, vitamins, etc., are probably latent at the present time; they are exerting little or no direct effect upon behavior. But suppose that the reader is asked to make a donation to the church; the formerly latent attitude is now activated by the request and it leads to a positive or a negative response.

Motives, in contrast to attitudes, are factors which initiate activity, sustain the activity in progress, or change the course of behavior. Thus, the painful prick of a needle is a motive; so, also, is a determination to join the navy.

The concepts of *motive* and *attitude* overlap since both have an influence in directing the course of behavior; yet each concept is distinct and different from the other in some respects.

It may be said that attitudes differ in the *degree to which they are motivating*. If, for example, a man has resolved to take a vacation trip after two weeks, this is a *specific determination to act* and is increasingly motivating as the need for preparation increases and the departure time approaches.

Another way in which attitudes differ one from the other is in the *direction* toward which they predispose behavior. Thus, an attitude may predispose the individual to vote the republican ticket, to attend a particular church, or to throw stones at cats. Again, an

attitude may incline the individual toward a very specific form of behavior: toward hostile attack or friendly behavior; an escape from danger or the courageous facing of danger; sexual advance or sexual avoidance; eating food or letting it alone. These specific activities clearly differ in form; the predispositions to carry them out differ in *direction*.

These considerations show that attitudes and motives are intimately related to each other. Although we define an attitude as a predisposing factor in behavior, and a motive as energy-liberating, actually attitudes and motives do not function separately. They coexist as different factors in the determination of behavior.

In the present and the following chapter we shall examine attitudes and motives for their own sakes, thus laying the foundation for later discussions of their rôle as basic determinants of emotion.

THE ATTITUDINAL APPROACH

A man's reactions to everything about him are what they are, to a considerable extent, because of his attitudes toward his world. This is another way of saying that the result of any observation is dependent, in part, upon the attitude of the observer.

The relation between observation and attitude will be illustrated by an account of the controversy over the existence of canals on the planet Mars. The story is one of great psychological interest and centers around the problem of perceiving markings which are barely visible to the human eye.

Observation in Relation to Attitude, Illustrated by the Perception of Canals on the Planet Mars. Every high-school boy has heard about the so-called canals on the planet Mars and the assumption that intelligent creatures made them. Whether such canals actually exist or not is a question for astronomers, but quite apart from objective facts the controversy concerning the existence of these canals bristles with factors of psychological interest.

During the years 1877-79 an Italian astronomer, Schiaparelli, at Milan, observed a remarkable network of broad curved lines and narrower straight ones of a dark color on the surface of Mars, which he called *canals*. His ability to observe these canals improved from year to year. As he repeatedly gazed through his telescope, these lines appeared straighter and more numerous. One evening he observed

a remarkable phenomenon—the twinning of one of the canals. There were two parallel canals where but one had shown before. He suspected some optical illusion and so changed his telescope and eye-pieces; but the phenomenon was apparently real.

Upon still further observation one canal after another became two, until some twenty of them had doubled. This increased his wonderment as well as the incredulity of other people. At this time nobody else had succeeded in seeing the canals at all, much less in seeing them doubled.

It was not until 1886 that anyone else saw these canals of Mars. In April of that year, Perrotin observed them in the observatory at Nice. The occasion for his observation was the setting up of a great glass with a twenty-nine-inch aperture. His first attempt to see the canals resulted in failure; so, later, did a second. Perrotin was on the point of abandoning the search when on the fifteenth of the month he quite suddenly detected one of the canals. His assistant, M. Thollon, also saw it immediately afterward. Then they managed to make out several canals, some single, some double, substantially as Schiaparelli had drawn them.

Since these earlier observations other persons have been able to see the canals; but, in 1895, the astronomer Lowell remarked that the number of persons who had observed them might almost be told on one's hands and feet.

Lowell himself repeatedly observed the canals of Mars from his observatory at Flagstaff, Arizona. As seen by Lowell, the canals are straight and they make geometrical patterns; the markings are very fine and at the intersections are "oases." Lowell observed about four times as many canals as had Schiaparelli in 1877. Other astronomers were skeptical, but Lowell merely replied that to observe the canals of Mars one must have still, steady air such as exists at Flagstaff.

In 1907, E. S. Morse reported as follows his experiences in attempting to observe the canals:

Professor Percival Lowell, of Flagstaff, Arizona, finally gave me the opportunity I so much desired and, through his courtesy and kindness, I was enabled to observe Mars every night for nearly six weeks through his twenty-four inch refractor, the last and probably the best telescope ever made by Clark, mounted in one of the steadiest atmospheres in the world and at an altitude above sea-level of over 7,000 feet. Imagine my surprise and chagrin

when I first saw the beautiful disk of Mars through this superb telescope. Not a line! Not a marking! The object I saw could only be compared in appearance to the open mouth of a crucible filled with molten gold. Slight discolorations here and there and evanescent areas outlined for the tenth of a second, but not a determinate line or spot to be seen. Had I stopped that night, or even a week later, I might have joined the ranks of certain observers and said "illusion" or something worse. And right here it was that my experience in microscopic work helped me, for, remembering the hours—nay, days—I had worked, in making out structural features in delicate organisms which my unprofessional friends could not see at all, I realized that patient observation would be required if I was to be successful in my efforts. My despair, however, was overwhelming when Professor Lowell and his assistant, looking for a few moments at the same object, would draw on paper the features which had been plainly revealed to them, consisting of definite shaded regions, a number of canals and other markings, of which, with the utmost scrutiny, I could hardly detect a trace. . . . [80-81]

Later, however, Morse saw some canals and drew a diagram of them.

The objective existence of the so-called canals of Mars rests wholly upon direct human observation, for they have never been photographed. The failure of so many observers to see them has led to a wide disbelief in their objective existence. But despite uncertainty regarding the existence of canals upon Mars, interpretations have been rife. Lowell in 1895 summarized his complete argument as follows:

We find, in the first place, that the broad physical conditions of the planet are not antagonistic to some form of life; secondly, that there is an apparent dearth of water upon the planet's surface, and therefore, if beings of sufficient intelligence inhabited it, they would have to resort to irrigation to support life; thirdly, that there turns out to be a network of markings covering the disk precisely counterparting what a system of irrigation would look like; and, lastly, that there is a set of spots placed where we should expect to find the lands thus artificially fertilized, and behaving as such constructed oases should. . . . [210]

In later publications Lowell elaborated the argument for the existence of intelligent beings on the planet Mars. He furnished maps and charts and arguments favoring his hypothesis. Life on Mars, he wrote, is becoming extinct. It will soon go, cosmically speaking. Evolution produced a single species which exterminated or sub-

ordinated the others. Members of this species had to coöperate in order to get water and survive.

From the psychological angle there are special problems centering around the perception of something barely visible. In this connection there are also problems based upon the influence of belief and desire, of suggestion and self-hypnosis, in perceiving objects.

In 1907, the astronomer Douglass, after stating certain recognized physical facts about Mars, went somewhat out of his field to give a psychological explanation of the controversy over canals. He wrote:

There is no doubt that there is a complicated plexus of markings on the planet; but as to the general canal interpretation, I have much doubt. In investigating visual work done on the limit of vision, from the view-point of experimental psychology, I have found several peculiarities that, under similar conditions, produce just such lines, whose sole existence is in the eye, and is due to the well-known phenomenon of rays. Black rays appear around a black spot, just as white rays around a star, and are due to the same cause—irregular refraction in the lens of the eye. . . . These rays are actually present around every small dark marking; and when one is looking for such markings on the limit of vision, he is apt to see rays, the more care, patience and industry he uses.

In this ray phenomenon we have the explanation of the multitude of radiating canals, which to a number of observers characterize the “lakes” and “oases” of Mars. . . .

Another class of canals is due to a halo phenomenon. To illustrate this, I have devised the following experiment: Make a small spot of ink on a blank card and place it at a distance of six to twelve feet from the eye. Around it appears a white area surrounded by a dark ring, which presents the appearance of a halo around the spot. This halo explains at once canals parallel to the limb or to large markings. Since white spots may produce a ring, or secondary image, as well as dark, light areas within dark markings may merely be the secondary image of adjacent light areas. Here we have an explanation of those curious results of Schiaparelli in his map of 1888, where he shows not only a considerable number of canals, but also some of the seas, as double.

Another class of canals really exist, but derive their form through misinterpretation. From various causes, irregular areas appear to the eye to be canal-like in form, when on or near the limit of vision. This I have studied extensively by means of naked-eye views of the moon. I find that such errors apply only to markings so large and conspicuous that there is no doubt of their reality.

And lastly, the study of artificial planets reveals the fact that on a perfectly blank globe rays sometimes appear radiating from near the center. . . .

From the foregoing, it will be seen that what I have to add to the litera-

ture of this subject, by supplying a psychologic origin, destroys most of those canals upon whose artificial appearance rests the strongest habitation argument. But it shows that the investigation of the canals has been done in a conscientious belief in their genuineness, and that work in the future should be free from such errors. [116-118]

The interesting psychological argument of Douglass is based solely upon optical effects, but there is much more to the psychological interpretation of the Mars controversy than this. We know that a verbal suggestion to observe a particular effect plus repeated attempts to observe it may result in the observation of the suggested phenomenon. The facts of normal suggestion and self-hypnosis need only be recalled in this connection.

It may be taken for granted that the astronomers who observed canals on Mars were sincere and honest men. Their observations were genuine; yet despite all this the objective existence of such canals has yet to be convincingly demonstrated.

Psychologically considered, the line of demarcation between imagining and perceiving cannot be sharply drawn. This may be illustrated by reference to the classical experiment of Perky. She instructed her subjects to imagine some object, such as a tomato or an orange or a banana, upon a ground-glass screen. On some of the trials she silently signaled to an assistant in the adjoining room who with a stereopticon projected a faint optical image of the suggested object on the screen. The optical image was hazy in form and dim in color, but frequently it was definitely perceptible to an outside observer. The subjects did not suspect the trick. They described the perceived object as if it were truly an object of imagination, similar to the imagined object which was observed when no physical image was presented. Even when the colored form was distinctly above the color threshold (distinctly perceptible), the subjects did not detect a difference between the imagined and the perceived objects.

If this confusion between imagination and perception can be demonstrated in the laboratory, without hypnosis, it is clear that a belief in the existence of canals upon Mars might well lead the observers to the perception of canals through the eyepiece of a telescope.

The controversy over the canals of Mars, recorded in the pages of astronomy, is full of psychological interest. Whether or not Mars is marked with canals is a question which can safely be left to astronomers, but in the meantime it is a psychological fact that canals have been observed and that some astronomers have based upon the existence of these canals their belief that Mars is inhabited. The attitude of an observer may definitely determine what he does and does not perceive.

A Lesson from the History of Psychology. Not only in the field of observation but also in the area of theory and interpretation are human attitudes of great importance. This is illustrated in the history of psychology—and of the other major sciences.

That varied and conflicting schools of thought—systems, *isms*, theories, doctrines—have appeared in the course of scientific development is a familiar fact of history. Everyone knows that psychology is no exception in this respect. Each school or *ism* has set up its own principles, worked toward internal consistency under the leadership of some dominant personality, and finally merged into the great onrush of psychological development. The past fifty years have witnessed the rise and decline of several such systems of psychological thought. Each one has had its day. An historical review of psychological systems indicates that each system rests upon its postulates—upon something affirmed and something denied.

One great and enduring rift within psychology has been that created by the distinction between *subjective* and *objective* points of view. Instead of minimizing this difference, the present writer believes that it is important to stress the validity of the distinction.

The *objective* point of view is an assumption that the world of objects, events and relations exists in its own right quite apart from the person who observes and analyzes it. Resting upon this assumption are the great physical sciences—physics, chemistry, astronomy, geology, and the others—as well as the common usages of everyday living throughout the world.

The *subjective* point of view, in contrast, is the assumption that every fact of observation depends directly upon sense organs, nerve cells, and the organs of response. All the attributes of direct experience (such as extent, externality, solidity, movement, symbolic significance, pleasantness or unpleasantness, memories, dreams, and

ideas) depend for their existence upon neural processes within the experiencing organism. Support for this view is found in the fact that, when one takes a whiff of ether, or goes into deep sleep, or faints, the entire world of direct experience with all its attributes vanishes. So far as the individual is concerned it does not then exist.

These two points of view are logically opposed, but *both* are correct and we do not need to choose between them. Incompatible perspectives do not force us to choose one view as correct and to reject the other as incorrect.

The really basic truth is that a man, by making widely differing postulates and definitions, can take up logically opposed points of view. It is literally true that the aspect of the world which an observer sees depends directly upon his theoretical attitude.

In common words, we have such propositions as these: The way a man understands the world depends upon his bias or prejudice. What a man observes indicates his interest or attitude. Each man's point of view or attitude makes the world what it is to him.

Hence, if some hypothetical man from Mars could come to earth and observe the activities of human beings, he would conclude that all psychological systems (assuming that they could in some way be discovered) are specific instances of one and the same principle. This principle is that both observation and interpretation in psychology are relative to the attitude of some individual. The *fact* of attitude is more fundamental than any specific instance of it.

The Attitudinal Approach to Psychology. Eclecticism is one way of meeting the conflict between the objective and subjective points of view. The psychologist can take whatever point of view is convenient in meeting his aim; he can shift his point of view as frequently as he pleases and attempt to correlate the facts observed from logically different standpoints. This way of meeting the multiple-aspect situation may result in narrow specialization. It may also lead to superficiality or to despair!

Another way out for the psychologist is to make a frontal attack upon attitudes as such—their nature and working. This course we shall attempt to follow.

It is a fact of major psychological importance that the individual can maintain an attitude, assume a point of view, and that he can shift from one point of view to another. Such shifts in attitude make

tremendous differences in human activity and conscious experience. This truth, implicit in the above discussion of attitudes, leads to the formulation of an attitudinal approach to the problems of psychology. This is an approach which accepts the *fact* of attitude as basic.

If an attitudinal approach to psychology is followed, there are several principles which may serve as guideposts to mark the way. These principles are stated dogmatically below.

1. *The study of attitudes must be psychological rather than logical.* A logical approach is likely to lead to a classification of attitudes in terms of their objects or in terms of their basic assumptions. Since the number of possible attitudes is infinite, such classifications are futile and can only retard psychology in its development. Logical analysis is one thing; psychological analysis is something quite different.

2. *All attitudes must be assumed to exist as psychological facts of nature on the same neutral level of existence.* If, to illustrate, a man insists that the world is flat and that it rests on the back of an elephant—a primitive conception—this insistence reveals an attitude, which is a *psychological* fact. Men commonly evaluate attitudes as good or bad, true or false, right or wrong, beautiful or ugly. A man is praised or blamed for his “stand.” Such evaluations are required in daily life, but when we look at attitudes in a matter-of-fact way, they all are seen to exist on the same neutral level of existence. For the psychologist, then, attitudes are not “right” or “wrong.” They are psychological facts of nature needing to be reckoned with as such.

3. *In a positive manner the investigator should seek answers to problems such as these:* What is an attitude? How can one attitude be distinguished from another? How are attitudes formed? How changed? How can a psychologist distinguish between attitudes and motives? To what extent can an attitude be carried over from one situation to another? What is the rôle of attitudes in the motivation, direction, and development of human behavior? These and many similar questions go to the very heart of the problem of attitude in an objective psychological sense.

Throughout this volume the *attitudinal* approach to psychology is presupposed. This approach is useful in the analysis of attitudes

and it is especially important to affective psychology since emotional conflicts lead to the formation of new attitudes.

SOCIAL ATTITUDES

An attitude was defined above as a neural readiness or predisposition within the individual to respond in a particular way toward some object, situation, or event.

Social attitudes are those which have been acquired from the social environment—the individual's world, made up of the voices, facial expressions, gestures, and actions of other persons; the products of their activity such as printed books and tools; and the more intangible customs and taboos of a tribe, the laws and other social institutions.

Place of the Concept of Attitude in Social Psychology and Sociology. Although the concept of *attitude* is important in experimental psychology and in psychiatry and clinical psychology, it is of especial importance in social psychology and sociology. Regarding the significance of this basic conception in social psychology Gordon Allport (1935) wrote: "The concept of attitude is probably the most distinctive and indispensable concept in contemporary American social psychology. No other term appears more frequently in experimental and theoretical literature. . . . [It] has virtually established itself as the keystone in the edifice of American social psychology."

In sociology the concept of *attitude* has recently become very popular. The sociologist requires a psychology which can describe the mechanism by means of which culture is carried. At one time the doctrines of imitation and suggestion sufficed. Later McDougall's doctrine of instinct was introduced. In contemporary sociology the concept of *attitude* serves the purpose. The acceptance of this term has grown steadily since it was employed in the work of Thomas and Znaniecki (1918).

Biological and Cultural Factors in the Origin of Attitudes. The conception of attitude is of primary importance in social psychology and sociology, but it must not be imagined that attitudes are exclusively cultural in origin. How far are attitudes biological and how far cultural in origin?

This question was raised by Allport and Schanck (1936). In an

attempt to answer it the following exercise was given to Harvard and Radcliffe students. The students were instructed in this way:

In greater or less degree the law condones the taking of a human life under the following circumstances. Assuming that the circumstances of the combat always give fair play to both combatants, arrange these situations in the order of greatest justification for the killing at the top of the list to least justification at the bottom, following your own feelings as a guide.

1. In defending the safety of one's family.
2. In protecting one's property against trespassers.
3. In defending the honorable reputation of a member of one's family.
4. In defending one's property against burglars.
5. In defense of one's own life.
6. In fighting for one's country.
7. In order to protect one's own honor or reputation.
8. In order to save the life of another human being. [197]

This exercise was presented to classes in social psychology during a period of five years. The rank order for the justifiability of homicide remained the same year after year for nearly all the situations listed. Only for those situations dealing with "honor" was there any variation. The rank order of the eight items for the total group is indicated below.

	200 Men	110 Women
Defense of self	1	1
Defense of family	2	2
Defense of another	3	3
Defense of country	4	4
Defense of honor of family	5	6
Defense of honor of self	6	5
Defense of property against burglars	7	7
Defense of property against trespassers	8	8

Allport and Schanck conclude that biological factors which determine the attitude toward homicide rank ahead of cultural factors. Preserving one's life ranks first and preserving the life of the family and others is rated ahead of defense of country, honor, property. It is interesting to note that the defense of honor ranks higher than the defense of property.

Attitudes and Behavior. It was brought out early in this chapter that attitudes differ widely in their degree of motivating effectiveness. This fact must be kept in mind as we consider the relation of attitudes to behavior.

Faris (1925) distinguished between *latent* and *kinetic* attitudes. To illustrate: A girl's liking for ice cream is an attitude which most of the time is inactive or latent. When the girl is mentally set to go to the store and buy ice cream, her attitude is kinetic; which means that, though no actual movement is observed, the set is a motivating tension within her. Having drawn this distinction, Faris (1928) went on to define an attitude as a tendency to act in a certain way: "The term designates a certain proclivity, or bent, a bias or predisposition, an aptitude or inclination to a certain type of activity."

Faris drew a distinction between attitudes and wishes:

An attitude exists as a tendency even when latent; a wish is always more or less dynamic or kinetic. A man may be said to have an attitude toward coffee. If he be very fond of coffee he may come to wish for coffee on occasion. Having had three cups, and enjoyed them all, he still has an attitude, the same attitude, toward the object, coffee; but he does not, let us hope, wish for any more. He may wish later. He has an attitude, but no wish. [279]

Stated in other words, a man's coffee attitude may be favorable at all times, but his wish for coffee varies with the period of coffee deprivation—with the recency and completeness of his appetitive satisfaction. The distinction which Faris clearly draws is that between attitude and motive. The distinction can be brought out by these two questions: *Do you like coffee?* or *Do you wish coffee?* The first refers to attitude; the second to motive. If a man were satiated upon coffee, he might be averse to taking any more but still report that he likes coffee, his attitude being positive but motivation lacking.

The same distinction has been drawn in a different way by Gordon Allport (1935) in a critical review of the literature upon attitude. Allport defines an attitude as: "A mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related."

Allport states that an attitude may or may not be motivating.

Raising the question, *Have attitudes motive power?* he distinguishes between two types of attitude: one which is so organized that it actually *drives*, and the other which merely *directs*. Both types, he says, are conditions of readiness and both enter into the determination of conduct. This would imply that attitude, or *readiness for response*, has two meanings: (1) passive direction or regulation and (2) motivation or the active initiation of movement. We make the same distinction but designate the former (direction of behavior) as *attitude* and the latter as *motive*.

During recent years psychologists and sociologists have devised tests for measuring attitudes.¹ One of the most frequently used techniques for measuring attitudes is that worked out by Thurstone and Chave (1929). In a test of this type the subject is instructed to indicate by a check the statements in a printed list with which he agrees and to indicate those with which he disagrees. For example, in a test of attitude toward war there are twenty-two statements of opinion about war—some favorable to war and others unfavorable. Sample statements are these:

- () Compulsory military training in all countries should be reduced but not eliminated.
- () The misery and suffering of war are not worth its benefits.
- () War brings misery to millions who have no voice in its declaration.
- () Because right may be more important than peace, war may be the lesser of two evils.
- () There is no progress without war.

From the responses of the subject to these statements of opinion a score is computed which is a numerical index of his attitude with respect to war.

Such tests have been very popular in part because of a common belief that a person's behavior can be predicted if his attitudes are known. But the relation between behavior and the results of an attitude test is by no means as simple as this.

On this point LaPiere (1938) has shown that the attitude as measured by an attitude scale may or may not indicate a preparation to respond in a definite way to a specific situation. Since this ambiguity exists, it is impossible to predict behavior from measurements of

¹ References to the literature of attitude measurement are given at the close of this chapter.

attitudes. Such measurements, however, do give a useful indication of ideology. To clinch the point LaPiere presented the results of a study of the causes of antagonism against Armenians on the part of non-Armenian residents of Fresno County, California.

The 879 separate explanations which were secured were highly standardized. The most popular was that the Armenians are "dishonest, lying, and deceitful"; in supplementary interviews, bankers, credit men, and merchants were found almost invariably to give this as their explanation. The second explanation in point of popularity was that the Armenians lived parasitically on the community and accounted for the major burden of charity, both private and public; when questioned, directors of charitable institutions and of public relief and professional social workers supplemented this finding. The third explanation was that the Armenians were a cantankerous lot, always going to law with some grievance or other; the District Attorney and his staff, local judges and their staffs, and private lawyers heartily endorsed this interpretation.

These, then, are the three common ideologies by which the people of Fresno County explain their antagonism to the Armenians. An examination of the actual experiences of the people of the community with Armenians, however, shows the following facts: Over the years the Armenians have as a group a better credit rating with the Fresno Merchant's Association than have non-Armenians. The records of the County Hospital and the County Welfare Bureau revealed on the average that the Armenian member of the community requires only 20 per cent as much charity and relief as the non-Armenian member. An audit of civil and criminal court records indicated that the Armenian almost never gets involved in a criminal action and that he is considerably less likely to go to law or to be dragged into law in civil-court cases than is the non-Armenian. What the ideologies of the non-Armenians are related to, what has occasioned them, and to what extent they affect behavior toward Armenians cannot be deduced from this study. One point, however, has been disposed of: The ideologies have no direct relationship to past experience. [181]

The ideology which is tapped by an attitude test is one thing; the behavioral facts in the situation may be something else. Psychologically considered, it may be that the ideology is only a rationalization of certain more basic factors which are not admitted or which have not been made clearly conscious to the individual.

In generalizing upon the relation between behavior and the mental organization which is tapped by an attitude test, it may be concluded that any one of several relationships is possible.

First, an attitude test may reveal well-organized beliefs and disbeliefs about which, however, the subject is not moved at the time of the test to do anything. For example, in an attitude test the individual may assent to the proposition that it is ethically right to contribute to the Red Cross and may express hearty approval of that organization; yet when it comes to a practical test, the same person may contribute not a single cent to the Red Cross. His expressed attitude is one thing; his behavior, something else. Most of our attitudes are latent most of the time, as we have said, and latent attitudes, while ascertainable in an attitude test, do not influence gross behavior except when they are activated.

Second, the subject's response in an attitude test may reveal a rationalization, or perhaps a deliberate deceit, which merely conceals the subject's true attitude. The response is for the purpose of gaining or keeping social approval. To illustrate: A college student may be an habitual cheater when writing examinations; yet in taking an attitude test he may express definite disapproval of dishonesty in the class room.

The attitude test, although it may reveal some rationalization, does not lay bare the basic motivation. Thus, for a good many years the vegetable growers of California have been expressing a strong bias against the Japanese, making derogatory remarks about them, imputing to them many and varied vices. (This was going on long before there was any thought that our country might have to go to war against Japan.) The real source of the difficulty, in this instance, has been an economic one. The Japanese maintain a low standard of living, their women work in the fields, and thus they can undersell competitors and control the markets. The *expressed* attitude of antagonism has been a rationalization. An attitude test would reveal this racial prejudice but offer no explanation of its true motivational basis.

Third, an attitude test may tap mental organization which is unknown to the subject at the time of the test. For example, in day-to-day dealings with foreigners a man may develop a friendly manner and friendly attitudes of which he is scarcely aware. He has never analyzed or even considered his attitude toward the foreigners. Yet simple questioning or an attitude test would reveal the attitude.

Finally, the response to an item in an attitude test may be regulated by a motive—a determination to act. For instance, if a man has resolved to vote for a particular candidate in a forthcoming election, his response to an item of an attitude test may be based directly upon this determination. The response indicates a motive rather than a latent attitude.

There are various possible relationships between attitude and overt behavior, as we have seen. An attitude test does not necessarily reveal motivation and for this reason it cannot be used to make dependable predictions of behavior. To attack productively the problem of attitude in relation to behavior, therefore, it is necessary at the start to distinguish between latent structural organization and those factors which motivate behavior.

Attitude and Subjective Experience. A similar ambiguity is discovered when attitudes are viewed from the standpoint of the experiencing individual. What is an attitude, considered subjectively?

Light is shed upon the nature of the subjective experiences of attitude by the broad definition given by Thurstone and Chave (1929): "The concept 'attitude' will be used . . . to denote the sum-total of a man's inclinations and feelings, prejudice or bias, preconceived notions, ideas, fears, threats, and convictions about any specific topic. Thus a man's attitude about pacifism means . . . all that he feels and thinks about peace and war. It is admittedly a subjective and personal affair."

This definition clarifies somewhat the subjective conception of attitude, but it is not very precise. If we ask individuals to describe the way in which attitudes are experienced, they use such terms as "I *feel* that . . .," "I *believe* that . . .," "I *know* that . . .," "I *think* that . . ." These words refer mainly to the cognitive aspect of experience; they indicate that from the subjective point of view an attitude is largely a cognitive affair. Such terms as *desire* and *wish* emphasize motivation rather than latent attitude, and these terms are used in describing motives.

An attitude test does not ordinarily yield information about the subjective experience of individuals. It yields, rather, a numerical index of some attitude held by a group of persons. The score of an individual on an attitude test is significant chiefly because it is related to the scores of other persons.

Changes of Attitude and Motive. In the summer of 1940, the writer read the views upon peace and war which had been stated by a distinguished professor of law in an eastern university. These views convinced him that the United States should remain neutral in any European war. Several days later he read the views of the president of the same university. Again the writer was convinced that from a more far-seeing standpoint it was to our country's interest to aid England and France in the war rather than to remain neutral. Such shifting of opinion shows how mistaken we are when we believe that our attitudes are wholly the result of our own independent thought.

Shifts of motivation are frequent in everyone's experience. An instance of such vacillation is that of a colored maid who had applied for a job. At home that night her husband told her that it was not necessary for her to work, and after this she declined the job. The next day, however, she talked again to the prospective employer and, realizing her need for cash, accepted the job. In the evening she returned home. Under home circumstances, bombarded by persuasive arguments from her husband, she declined the proposed job by telephone. Despite all this she decided to work and actually appeared for duty the next morning. This woman showed no greater degree of motivational shifting than the average person would under the influence of similarly conflicting motives.

The following example has been given by a social psychologist. A group of farmers in a village of northern Wisconsin met in the afternoon and, under the influence of a persuasive speaker, voted to call a milk strike. In the evening this same group met again to hear a speaker with opposite views. After the evening speech, the farmers voted unanimously not to strike.

We all know that attitudes and motives can be changed by a speech, a film, a newspaper report, a radio broadcast, or by some bit of information from another source. The practical question, however, is, *To what extent can attitudes and motives be changed?*

There are in the literature of the field a number of experiments dealing with changes of attitude. For example, Thurstone (1931) has demonstrated that motion-picture films produce measurable effects upon the attitudes of children. The film *Son of the Gods* has been considered friendly in its interpretation of Chinese culture. This film was shown to school children in Geneva, Illinois. One week before

and the day after seeing the picture, the children filled in a statement scale about the Chinese. Following the presentation they were found, to a significant degree, to be more favorably inclined toward the Chinese. Another film, *Welcome Danger*, has been criticized by the Chinese for its unfriendly manner of dealing with them. This film was shown in West Chicago. One week before and the day after seeing the picture, the children filled in the same scale about the Chinese that was used in Geneva. Although the change of attitude was less than that produced by the first film, *Welcome Danger* left the children slightly more unfriendly toward the Chinese than they had been at the start.

Do such vacillations imply that a scientific study of attitudes is impossible? Indeed not! Obviously, it is important to study the factors which change attitudes and the extent to which these factors are effective. Techniques are available for measuring attitudes and for analyzing the factors which change them.

Words and Deeds in Relation to Attitude. The disparity between words and deeds is brought out by Emerson's line, "Do not say things. What you are stands over you the while, and thunders so that I cannot hear what you say to the contrary." "Actions speak louder than words" implies that non-verbal behavior reveals attitude more correctly than verbal behavior does. A man, to illustrate, may give lip service to ethical principles which he does not apply in his business dealings. Or, again, a man may express an attitude of hostility against the Japanese and yet go on using and purchasing their manufactured products. Words and deeds frequently do not agree. This fact is especially apparent in the rationalizations or alibis which a man fabricates to defend some act of which he is ashamed. The implication, however, that deeds more truly than words reveal the individual's attitude, needs to be considered further.

Deeds themselves frequently distort and conceal an attitude as completely as words do. Both verbal and non-verbal behavior are modified, as Murphy, Murphy, and Newcomb (1937) pointed out, by considerations of courtesy, expediency, and various other forms of social pressure. For example, a young woman who for years had maintained the attitude, instilled by her mother, that gum chewing was the height of vulgarity, chewed gum when it was offered her by a young man whose attentions she desired. Further, she took a long walk in the country on a rainy day with the same young man

(though she disliked walking in the rain) because he expressed enthusiasm for being out in rainy weather.

From the psychologist's standpoint, verbal and non-verbal behavior have essentially one and the same relationship to attitudes. Both the spoken word and the non-verbal deed are significant parts of behavior. Both reveal attitudes, conceal attitudes, and depend in a similar manner upon attitudes.

The assumption of an attitude as a psychological entity and all our knowledge concerning it rest upon the observed facts of behavior, both verbal and non-verbal. In the writer's opinion, words both conceal and reveal attitudes more than deeds do; but instead of opposing words to deeds, the psychologist should look to both, and from both should attempt to construct the organization of the psychological individual.

Stereotypes in Social Evaluation. We all have mental pictures of a doctor, a missionary, a college professor, a preacher, a senator, a capitalist, a laborer, and so on. The cartoonists have selected certain features of each type, exaggerated them, and used these features as symbolic of the type. Thus, the doctor is shown as a man with a beard, and a bag in his hand; the missionary is represented as carrying an umbrella and a Bible; the college professor is typified by a cap and gown, a bulging forehead, and glasses; the preacher is represented by a clerical collar and coat. Just a few details stand for the whole, and the observer is left to fill in the picture according to conventional views.

Prominent individuals, too, are represented by certain outstanding features. Thus, Theodore Roosevelt was shown with large teeth, a heavy mustache, glasses, and a big stick. Franklin D. Roosevelt is shown as a man with a high forehead, a large jaw, and a smile. The Hitler stereotype is built around a small dark mustache and a lock of hair conspicuously draped over the forehead.

Pictorial stereotypes are only one form of "pictures in our heads." Our ideas about persons, institutions, races, etc., are also highly conventionalized. Examples of this can be drawn from a study by Katz and Braly (1933) upon racial stereotypes. These investigators gave a hundred Princeton students a list of eighty-four words descriptive of traits from which the students were asked to select the ones typical of Germans, Italians, Negroes, Irish, English, Jews, Americans, Chinese,

Japanese, Turks. The instructions provided for the addition of other terms if the ones listed were not adequate.

The results of the experiment revealed that there were racial stereotypes in these students' minds. Table 4 gives the number of times the five most frequent traits for each nationality or race were selected by the hundred students.

TABLE 4
RACIAL STEREOTYPES (FROM KATZ AND BRALY)

GERMANS		ITALIANS		NEGROES	
Scientifically minded	78	Artistic	53	Superstitious	84
Industrious	65	Impulsive	44	Lazy	75
Stolid	44	Passionate	37	Happy-go-lucky	38
Intelligent	32	Quick-tempered	35	Ignorant	38
Methodical	31	Musical	32	Musical	26
JEWES		AMERICANS		CHINESE	
Shrewd	79	Industrious	48	Superstitious	34
Mercenary	49	Intelligent	47	Sly	29
Industrious	48	Materialistic	33	Conservative	29
Grasping	34	Ambitious	33	Tradition-loving	26
Intelligent	29	Progressive	27	Loyal to family	22
IRISH		ENGLISH			
Pugnacious	45	Sportsmanlike	53		
Quick-tempered	39	Intelligent	46		
Witty	38	Conventional	34		
Honest	32	Tradition-loving	31		
Very religious	29	Conservative	30		
JAPANESE		TURKS			
Intelligent	45	Cruel	47		
Industrious	43	Very religious	26		
Progressive	24	Treacherous	21		
Shrewd	22	Sensual	20		
Sly	20	Ignorant	15		

The study of Katz and Braly indicates that some stereotypes are more definite than others. Definiteness is shown by the extent to which the subjects agree upon the descriptive terms. The most definite picture is that of the Negroes. The Germans and Jews also evoke fairly definite and consistent patterns of response, while the Japanese, Chinese, and Turks call forth the least clear-cut stereotypes.

Social evaluations and artistic judgments are also stereotyped in many cases. A study in which stereotypes were shown to determine judgments of literature was made by Sherif (1935). In this experiment, passages from Robert Louis Stevenson were presented to Harvard and Radcliffe students for ranking in an order of liking or disliking. Under each passage was the name of a fictitious author. The deception was not suspected by the students. One month previously, however, these same students had expressed preferences for the writings of the sixteen authors whose names appeared under the passages. These evaluations were utilized by Sherif in his experiment.

The correlations between preferences for Stevenson's passages and the previously tested preferences for the authors whose names were assigned to them are shown below:

Average correlation for 22 Harvard students	0.33
Average correlation for 17 Radcliffe students	0.45
Average correlation for 10 Extension Course adults	0.30
Average correlation for 8 School of Education students	0.31
Average correlation for total (57) students	0.36

Students who reported that they deliberately covered up the author's name or ignored it showed no significant correlation.

The experiment indicates that our biases in favor or disfavor of certain writers tend to modify our appraisals of works allegedly written by them. A mediocre literary passage is rated more highly if attributed, for example, to Shakespeare than if a less well-known name is attached to it. The name of a favored author tends to pull up the rating of a passage, and conversely the name of a less favored author tends to pull it down.

We may like or dislike a *word* with little or no understanding of the reasons for the bias. For example, Stagner (1936) found that a vast majority of the population disliked the stereotyped term *fascism* although they accepted a large number of the specific policies which identify fascism: breaking up labor unions, attacking radical political parties, holding prejudice against persons of different nationality or racial origin, and so on.

From the above studies of stereotypes it may be concluded that one's evaluative attitudes are far from infallible.

THE NATURE OF MOTIVATION

In the literal meaning of the word, *motivation* is the process of arousing movement. Factors which initiate, sustain, or change the course of bodily movement are, by definition, *motivating*. This is true regardless of the point of view from which these factors are defined.

Psychologists conceive and describe the process of motivation in various ways. (1) To one, a motive is always a stimulus—physical energy which excites a receptor or nerve cells. (2) To another, a motive is a chemical state, such as thirst or fatigue, which regulates the excitability of nerve cells. (3) To still another, a motive is a determination to act; an intention or set, which both initiates and channels bodily movement. (4) There are psychologists who assume tensions and forces which drive the organism, such as the *libido* of Freud, the *hormic force* of McDougall, the *tension* of Lewin. (5) Down through the centuries has come a doctrine of psychological hedonism which holds that conscious feelings of pleasantness and unpleasantness are human motives. (6) Finally, there is the belief that all external situations motivate so far as they arouse action. For example, when a man sees the roof of his house on fire or meets a long-lost friend on the street, he does something about it.

Although the above six concepts of motivation are very divergent, in each of them is the implication that motivation is a process of arousing movement. Motivating factors, in whatever frame of reference they are described, in whatever terms conceived, are those which initiate bodily movement, sustain the activity in progress, or change its course. This implies that motivation is a process of liberating energy within the organism.

This definition of motivation is so inclusive that it suggests the question, *Are there psychological factors which do not motivate behavior?* The answer is plainly in the affirmative. Every individual carries around with him inert "possibilities of action," as Woodworth (1918) called them, which are not motivating as long as they remain inert. At the present time, for example, the reader doubtless has habit organizations which can direct such behavior as driving an automobile, doing a problem in geometry, carving a beef steak, speaking in some foreign language, singing *The Star Spangled Banner* (at least the first verse!). No one of these activities, we assume, is in

progress or even incipiently aroused right now. The latent habit organization is inert, non-motivating, although it may direct behavior if a stimulating situation activates it. There are other non-motivating psychological factors, for instance, the structural organization of a reflex arc or the latent organization of a social attitude.

Actually behavior is energized in varying degrees from minimum to maximum. This is illustrated by the way in which some students write examinations. They begin at a low level of activity and work more and more energetically as the time passes until, when the warning bell rings, they are feverishly struggling to finish the test. Their varying levels of activity indicate corresponding degrees of motivation. The transition from one degree of motivation to another may be very gradual.

Pseudoexplanations of Behavior. Attempts have been made to account for the motivation of behavior through assuming the functional autonomy of motives and through the assumption of general drives, instincts, and wishes. A brief superficial examination of these concepts will follow here.

Gordon Allport (1937) has brought together many examples of seemingly autonomous habitual activity. For example, if a farmer has for years started his daily work at an early morning hour, he may continue to arise at this hour even when there is no longer any financial necessity for doing so. A habit which was established under one set of motivating circumstances sometimes persists when those circumstances have changed. Occasionally an habitual action seems to run along of its own accord, to function autonomously.

A similar explanation of behavior is that of an anthropologist who once remarked to the writer that primitive man *likes* what he is accustomed to and does what he *likes*. This statement implies that, when a habit system has been thoroughly acquired, it is pleasing to the individual merely to let the habitual activity continue and displeasing to disturb it. Habitual behavior is not explained, however, by the assertion that one *likes* what one habitually does and *dislikes* any disturbance of the habitual routine. Nor is any behavior explained by the assertion that a man continues to do what he has always done. Such statements may be true, but they offer us no adequate account of the motivation of behavior. There is no perpetual motion in psychology. Every activity, whether habitual or innate, is motivated in some way.

A different expedient used in the interpretation of behavior when the real determinants are unknown is a reference to general drives, instincts, or wishes. This form of pseudoexplanation has been criticized by so many writers that it will be unnecessary here to point out its limitations.

A reference to wishes, drives, instincts, or propensities as explanations of behavior gives the investigator a false sense of security. Scientific explanation makes use of specific and particular sensorimotor mechanisms, previous segments of behavior, or hypothetical processes which can be tested by observation and experiment. Stressing this point, Lashley (1938) wrote:

The current trend in social psychology and psychopathology is to elevate the drive to the position formerly occupied by instinct, as some general motivating force apart from specific sensorimotor systems. Actually, the term is nothing more than a general designation of reactions to deficit and its hypostatization as a real force can only blind us to the fact that each such reaction constitutes a special problem involving, perhaps, a unique mechanism. [469]

After all, as we have elsewhere pointed out, true explanation always adds something new to the fact to be explained. This additional information may be some fact concerning an organic process or a bit of previous behavior or a conscious state, or it may be a purely hypothetical construction. In any event, something more than a verbal label is added by any true explanation.

Motivation as a Quantitative Variable. It is common in the psychological literature to find reference to the *degree* of motivation. Motivation is regarded as a quantitative variable.

To define motivation quantitatively one must specify the criteria by means of which differences in degree can be measured. Some of the criteria which have been employed in human research are increments and decrements in: (1) speed of movement, (2) strength of muscular contraction as measured by a dynamometer, (3) rate of learning, (4) precision of movement, (5) quantity of work performed per unit time.

In animal research the level of activity has been used as a criterion of the degree of motivation. To measure activity level the animal is placed within an activity cage. A common form of this apparatus resembles the rotating drum seen in zoölogical gardens for exercising squirrels and other small animals. The number of revolutions of the

drum per hour or per day is counted mechanically. The activity level is found to vary with physical conditions such as age of the animal, temperature, period of food deprivation, stage of the estrous cycle, and experimental removal of a ductless gland. In other experiments, activity has been measured by the amount of work an animal performs—in pressing a lever, running back and forth, etc.—to attain a goal. An increase of activity level, dependent upon factors defined as motivating, is a *motivational increment*, and decrease is a *motivational decrement*.

Wholly apart from laboratory measurements, we constantly recognize differences in the degree of motivation. Mary is lazy, easy-going, languid; she lacks "motivation." John is vigorous, energetic, full of "pep"; he has a high degree of "motivation." Such motivational differences may depend in part upon the condition of health of the individual, but, whatever the cause, it is recognized that there are individual differences in degree of motivation.

Praise a school child for his correct spelling and he will more vigorously attack the next spelling list. The words of praise give an added incentive to his former motivation. Whip a horse or use the spur; the animal jumps forward with much release of energy. These differences in the level or vigor of activity depend directly upon motivating factors—factors which liberate energy and regulate its expenditure.

Latent Organization and Motivation. An individual's attitudes and habit organizations, with some exceptions, are latent most of the time. Only when an activating situation arises is the latent organization tapped and utilized in behavior. Here is an obvious example of habit organization:

"How much is 8 times 9?"

The reader replies: "72."

Neural organization determined the response. *Seventy-two* popped up at once. This organization was acquired years ago in the school room. The neural organization has been repeatedly exercised and utilized, but a moment ago it was entirely latent. Then it was aroused as a necessary condition of response to the arithmetic problem. The question, which came unexpectedly, aroused latent habit organization.

An illustration of a latent attitude is that of a strict mother who was very particular that her young daughter be well chaperoned

when in the company of boys. While the daughter was away at a well-supervised boarding school, the mother had no worries. Her attitude concerning the importance of chaperonage was latent. Then her daughter came home for summer vacation and, on the very first night, wanted to go out for a date with a boy friend. This situation instantly activated the mother's latent attitude.

These homely examples make it clear that a large amount of habit organization and attitude organization is quiescent most of the time. When some situation arises in which a specific acquired organization can function, this organization is activated and serves as the basis for integrating behavior. Passive organization, by definition, *is* passive; it does nothing. It merely exists as quiescent organization until aroused by an activating situation. In the absence of the passive organization, however, the integrated act would be impossible.

Suppose, to illustrate, someone should ask you to give a lecture in Chinese upon Einstein's theory of relativity. You would smile at the compliment (or perhaps the joke) and say that this is not possible. You know neither the Chinese language nor the theory of relativity. Because you lack the necessary neural organizations, it is no more possible for you to give in Chinese a lecture upon Einstein than for the writer to do a power dive without ever having learned to control an airplane. Human capacities are limited by previous opportunity and training, through which neural organization is built up.

Motivating factors are those which liberate energy, thus arousing certain segments of latent neural organization to action, producing movement. At any given time they arouse only certain movements out of all possible ones, the selection depending upon the exact nature of the motivating factors. Why this is true and how particular behavior patterns are motivated at a given time are basic problems for the student of motivation.

It should be added that a sharp distinction between active and latent organization cannot always be drawn because there are varying degrees of activity from minimum to maximum. A continuum of activity extends between the extreme limits of complete latency and maximal activity. Complete latency is the zero point, the limiting point of motivation.

Goal Orientation in Behavior. When a man finds himself suddenly plunged into the icy ocean, he struggles to reach the air, to keep afloat. From the standpoint of biological need, such a struggle

is necessary for survival. The man must reach the air to live. Even with sufficient air he cannot survive unless he maintains a stable internal temperature. Vigorous activity in the water aids in accomplishing both results.

At first he swims about with no particular goal; but, while he is struggling upon the surface of the water, he sights a life boat not far away. At once he swims in the direction of the boat. Behavior becomes boat oriented, clearly purposive. Now the man is not merely keeping afloat. His activity is directed toward an object. As the boat moves, the man's behavior changes to keep his body constantly oriented toward the goal. His actions illustrate the appearance of specific goal orientation in the course of random activity.

A gradual development of goal-oriented behavior can be observed in the laboratory. If, for example, a rat is placed in a maze, he explores it. Activity is not entirely aimless, however, for every act is organized. Such activities as sniffing, looking about, entering this blind alley and that one, manipulating an object, preening—all these activities are patterned. When, by chance, the rat finds food in the maze he eats it. On successive runs behavior becomes more consistently oriented toward the food until finally the hungry animal runs directly toward the goal box without stopping to preen or to enter blind alleys along the path. A new goal orientation has been built into behavior.

Under normal conditions all behavior is patterned; only certain activities are goal oriented, the rest being reflexive patterns. To illustrate, a chicken with its head chopped off dashes wildly about the barnyard for a few seconds, bumping into obstacles and flapping its wings. This behavior has no goal orientation but it is none the less patterned, organized. The physiologist calls such activity reflexive and points out that running and wing flapping depend upon coordinated contractions and relaxations of pairs of muscles and that such integrations depend upon neural patterns of coordination within the spinal cord of the decapitated bird.

In contrast with reflexive behavior of the headless-chicken type, goal-oriented activity is observed to be persistently directed. Ordinarily when a goal is reached, *i.e.*, when the consummatory act or goal response is made (a thirsty animal, for example, finds water and drinks it) a need is met and the degree of motivation is lowered. The

goal response consummates or brings to a close the goal-oriented act.

The goal orientations of an individual change frequently. When a motive has been reduced, another motive dominates behavior in such a manner that a new goal orientation appears.

Goal orientation is a fact of observation just as truly as is the fixed direction of a steel ball when it rolls down an inclined plane. It is a fact, for example, that a child, in chasing a ball, follows it in whatever direction it may go or bounce—to right or left, up or down, yet always oriented toward the ball.

Goal orientation can be *observed* in two forms: first, as a persistent and consistent direction or trend in behavior; second, as an overt posture or bodily attitude toward some object. In addition to these observable forms, goal orientation is also *assumed* to exist. A mental set to act, a specific intention, implies an orientation of the subject toward some end result; but this determination is only at times revealed in overt behavior.

Internal and External Determinants of Purposive Behavior.

Although every purposive activity is determined by both internal and external factors, the balance between these two groups of determinants is variable. Typical purposive activities can be grouped as in Fig. 1 according to the location of the principal stimulation which originates the behavior.

Seward and Seward (1937) have pointed out that the vegetative drives on the whole are cyclic because they are determined by recurring organic states such as hunger for food or filling of the bladder. Externally determined drives, by contrast, are non-cyclic; they appear and disappear with the inducing situation. For example, if a white rat is placed in a strange environment, he explores it; but, when he

External	Exploration
	Escape and submission
	Attack and ascendance
	Mate (male)
	{ Progeny Mate (female)
	{ Activity Rest
	{ Water Food
Internal	

FIG. 1. INTERNAL AND EXTERNAL DETERMINANTS OF PURPOSIVE BEHAVIOR. (Adapted from Seward and Seward.)



has become familiar with his surroundings, exploration ceases and does not return unless he is again put in an unaccustomed place. Similarly, when a man is working out a puzzle, he has an urge to persist until the puzzle is solved. When this is achieved the man's interest ceases; the drive is ended.

Although no sharp line can be drawn between purposive activities which are exclusively internal in origin and those which are exclusively environmental, the foregoing distinction between internal and external determinants of behavior is a serviceable one in any analysis and classification of drives.

In addition to the cyclic or non-cyclic character of drives, there is a further contrast between drives of organic and those of environmental origin. With organic drives the typical order of causation is from chemical change to neural excitation, but with environmental drives the order (at least in part) is from neural excitation to chemical change. For example, states of hunger, thirst, sexual excitement, fatigue, sleepiness, and others are describable as chemical conditions which motivate the organism through changing the excitability of nerves. As an illustration of an external factor which evokes internal chemical changes, it may be noted that almost any situation in which there is a biological emergency—danger, for example—excites the organism in such a manner that the adrenal glands secrete. Adrenal secretion, in turn, evokes a variety of internal neural and chemical processes.

Biological and Social Determinants of Behavior. Malinowski (1941) has listed a series of basic impulses, with their resulting acts and satisfactions, which are incorporated in all cultures. These primitive impulses rest upon well-known organic states. There are, however, other conditions (those which call forth maternal behavior and those present in certain specific food cravings and aversions) which might be added to the list. Malinowski's chart is worthy of careful study:

<i>Impulse</i>	<i>Act</i>	<i>Satisfaction</i>
Drive to breathe; gasping for air	Intake of oxygen	Elimination of CO ₂ in tissues
Hunger	Ingestion of food	Satiation
Thirst	Absorption of liquid	Quenching
Sex appetite	Conjugation	Detumescence
Fatigue	Rest	Restoration of muscular and nervous energy
Restlessness	Activity	Satisfaction of fatigue
Somnolence	Sleep	Awakening with restored energy
Bladder pressure	Micturition	Removal of tension
Colon pressure	Defecation	Abdominal relaxation
Fright	Escape from danger	Relaxation
Pain	Avoidance by effective act	Return to normal state

When we turn our attention to the environment we find there a countless number of situations which induce purposive behavior. Some of them are *social* and others are *non-social*.

The analysis of social motivation is a large and complicated task. The following tentative list of social drives which are present in the chimpanzee, and presumably also in man, is taken from Tolman (1941).

Gregariousness	<i>i.e.</i> , Returning to company of others of the group.
Loyalty to group	<i>i.e.</i> , Defending other members of the group against attack.
Imitateness	<i>i.e.</i> , Copying actions performed by other members of the group.
Dominance	<i>i.e.</i> , Dominating over another individual.
Submission	<i>i.e.</i> , Submitting to another.
Competitive acquisition	<i>i.e.</i> , Piling up material for the future—such activity being enhanced by the presence of other individuals.
Sharing with and soliciting from others	<i>i.e.</i> , Giving to another individual. Receiving from another individual.
Coöperation tendencies	<i>i.e.</i> , Working with another individual for a common goal.

It is interesting to note that every one of the social drives ascribed by Tolman to chimpanzees is also a well-developed social drive in human beings. These broad generalizations of behavior are based

upon a great variety of detailed observations by Köhler, Yerkes, and others. The generalizations are socially significant, but they are not to be regarded as explanations of behavior.

The specific factors within the social environment which induce behavior are protean. In animals a few examples are: a blow administered by the master, the latter speaking in a soft and low voice, the presence of a stranger, a rival competing for food or for the possession of a mate. With children, a reward presented by teacher or parent, a punishment, words of praise or reproof, a blow from another child, and the approach of a strange dog are all environmental factors which induce behavior. In each of these examples it is a specific stimulation which motivates behavior.

Examples of non-social motivating factors within the environment are: the novelty or familiarity of a situation, a danger or threat to one's safety (such as fire or rising flood water), and physical stimulations from cold temperature or heat or from the lack of air.

SET, TENSION, AND THE BALANCE OF MOTIVES

In view of the close relationship between motives and emotions, it is important to consider the nature of those sets and postural tensions which underlie the manifest outbursts of emotion.

Overt Posture and Mental Set. When a man or an animal is prepared to carry out some specific act he sometimes betrays his intention by posture and behavior. Thus the deer, when startled by a noise, stands with head erect, sniffing the air, and poised to run. The cat remains crouched before a mouse hole, ready to spring when a mouse appears. Human examples of such preparatory attitudes are frequently observed. The diver before jumping off the springboard maintains his stance. The student with hat in hand sits on the edge of his chair awaiting the class bell.

These explicit bodily attitudes prepare the individual for a specific action. There are also implicit mental sets which are preparatory but which are not outwardly observed. For example, when the members of a committee meet to discuss some particular topic, a predetermined plan dominates the discussion of the meeting. In social gatherings, by contrast, where there is no fixed plan of discussion, the conversation usually wanders from topic to topic with little direction. Thus a

conversation recently overheard by the writer at a dinner table thoroughly covered the topics of snakes, funerals, airplanes, bridges, and Billy Sunday!

A mental set is a fixed determination to respond in a particular manner to a stimulus-situation. The set may be released in a variety of ways. Thus if one intends to mail a letter, one can release this tension by dropping the letter in a mail box, by handing it to a friend for mailing, or by offering it to the postman. The mental set is the same regardless of the specific way in which it is released and revealed in behavior. As Lewin (1927) pointed out, activities which are very unlike in their superficial appearance may have a common motivation.

It is also true that activities which are superficially alike may be very unlike in their motivation. Two boys, both known to the author, returned lost dogs to their owners. One boy returned the lost dog out of sheer kindness. The other boy's motive was the hope of collecting a reward. Another instance is that of an actor who, in affecting a burst of anger upon the stage, is very differently motivated from the man who reveals genuine anger when insulted; yet anger on the stage may very closely resemble the genuine outburst. The important consideration is the motivating set.

A word of warning is in order about the use of the phrase *mental set*. This phrase is employed in diverse ways by psychologists today. Gibson (1941), in a critical review of the experimental literature, has pointed out that the term *mental set* and its variant forms are employed by psychologists to designate a variety of processes. Among other meanings the term *set* may signify: (1) a prearoused sensory expectation, as the awaiting of another beat in a rhythmical sequence; (2) an intention to respond to a situation by making a specific movement, as a set to switch on the lights when entering a dark room or, in the reaction experiment, a set to press the key when a light flashes; (3) an inner determination to perform a familiar operation, as to multiply or add or subtract or divide two numbers; (4) a wholly non-voluntary (spontaneous) readiness to return to some incomplete task and complete it; (5) the perseveration of a recent, vivid experience, as the running through one's head of a catchy tune or the re-living in imagination of a social event. The existence

of these diverse meanings shows the importance of a clear definition of the concept of *set* whenever the term is employed.

Postural Tension and Behavior. Physiologists have drawn a distinction between the tonic reaction of muscles and the phasic reaction. A tonic reaction is of relatively long duration; a phasic reaction is brief and transient. Almost any quick, brief movement, as tipping one's hat, waving a hand, or taking a step, is a phasic reaction. The phasic reaction supplies direction and pattern to behavior. Tonic reactions supply persistent motivation.

The persistent motivation comes from the stimulation of receptor organs in the muscles, tendons, and joints when a postural tension has been established. To maintain a bodily posture, as to hold out the arm against gravity or to pose as a statue, requires constant excitation of the muscle fibers and an expenditure of bodily energy. But the posture also stimulates the proprioceptors and is thus a source of persistent motivation. Freeman (1939) pointed out that at any given time there is a background of tonic excitation which to a considerable extent determines the intensity of an overt reaction.

There is a basal level of postural tension, Freeman states, which varies from individual to individual and which is characteristic of a given person. This level varies with age, with the metabolic state of the organism, and especially with the degree of external stimulation. External stimulations—from lights, sounds, contacts, odors—force the individual above his basal level. Increments of tonic activity from these and other sources are superimposed upon the existing level of postural tension. Internal stimulations—increased bladder pressure, for example—also heighten the general level of postural tension; the increased tension persists until relieved by an appropriate act. Further, a conflict-situation or the frustration of any goal-oriented activity heightens the level of postural tension. The heightened tension from conflict or frustration persists until some adjustment can be made.

There is a level of postural tension which yields the most effective performance of any skilled act. Below this level the quality and quantity of work varies directly with the degree of stimulation from the postural set. If the tension level exceeds a certain degree (that required for optimal performance) there is excitement and a breakdown or disorganization of the skilled act.

In some respects the view of Freeman is similar to that of Kempf which will be presented briefly in the next section.¹

Kempf's Doctrine of "Segmental Cravings" in Relation to Attitude and Feeling. The importance of autonomic functions can hardly be overstated. Kempf (1920) writes: "The autonomic apparatus is constituted of all the vital organs, including the ductless secretory glands, unstriped muscles and the ganglionic nervous systems that have to do with the *assimilation, conservation, distribution* and *expenditure* of energy-giving metabolic products and the *elimination* of the waste products. This includes the entire digestive, circulatory, respiratory, and urinary systems, sex organs, glands of internal secretion, glands of external secretion, and the autonomic nervous system."

Changes in postural tonus involve not only the skeletal musculature but also the glands and smooth muscles regulated by the autonomic nervous system. Thus, when an individual turns toward some part or phase of his world of experience with an attitude of "love-acquisitiveness," or "fear-avertiveness," or "anger-hate-destructiveness," this is not merely an attitude of the cerebrospinal nerves and the skeletal muscles. Along with the overt behavior and posture there are changes in the respiratory, circulatory, and gastrointestinal musculature, which have become tied up with the total response through the process of conditioning.

Further, the tonic changes in smooth muscle of the body excite cerebrospinal nerves. Thus from alimentary, urinary, genital, and respiratory functioning there arise afferent nerve impulses which have a more or less dominant effect upon the posture of the body as a whole. The gastric griping for food, the rectal griping for evacuation, the sexual tension, and the tensions and distensions of the circulatory systems are readily distinguished from each other. Kempf refers to these specific changes of visceral tonicity as "segmental cravings." They arise from any or from all of the great visceral segments: the bronchi, arteries, somatic muscle, esophagus, stomach, ileum, colon, rectum, bladder, internal genital organs, and others.

The afferent neural excitations arising from the viscera contribute

¹ Since completion of this manuscript a review of experiments upon the relation between muscular tension and performance has been published by Courts (1942). The advanced student is referred to this summary.

not only to the maintenance of postural tonus but also they furnish the organic groundwork for various conscious cravings and feelings. The feelings of well-being and comfort and the enjoyment of living, as well as the various experiences of organic distress, are conscious representations of the tonic conditions in visceral organs.

According to Kempf, the general law of attitude (postural tonus) is this: The form or pattern of attitude which exists at a given moment determines what the reactions will be to stimuli. That is to say, attitude determines the thoughts and movements which occur in response to an external situation.

Visceralized attitudes and visceralized intentions are known to play a vital rôle in human conflicts. The important conflicts of life, Kempf states, are those in which the cerebrospinal system opposes the autonomic. A person's desire for social esteem, to illustrate, may conflict with his sexual appetite. If he suppresses his sexual appetite for the sake of social esteem, a variety of nervous symptoms (indigestion, irritability, etc.) may develop, owing to the increased tension continually present. If he satisfies his sexual appetite and sacrifices social esteem, he may be classed as a delinquent, or an anxiety neurosis may develop. Thus, among people who engage in autoerotic practices it is not an uncommon complaint that for several hours or days following the indulgence they suffer from a severe sense of inferiority, fear of discovery, and shame. This is followed by a firm resolution (compensation) to prevent a similar recurrence. After several days the sexual tension is again built up and the "segmental craving" becomes more intense until finally this craving again dominates the entire organism. The resolution to maintain self-control and win social esteem is again overcome, and the cycle repeats itself unless, of course, some re-orientation (sublimation) can be effected or the person's situation can be so altered that the normal autonomic tensions can find release under conditions which meet with social approval (in our culture, marriage).

Anxiety Tension as a Form of Motivation. If an individual has been pained, injured, or humiliated in a given situation, he will anticipate a similar misfortune when again placed in that situation. To give a concrete example from the laboratory: If a dog has received a painful shock on the foot after the sounding of a tone, he will prepare himself for another pain on the foot when the tone

begins to sound or when he is again placed upon the conditioning apparatus.

Mowrer (1939, 1930-40) regards anxiety as a *learned* response which can be explained by the established principles of conditioning. Through the process of conditioning, certain signals (conditioned stimuli) become premonitory of pain or injury (unconditioned stimuli). After an individual has been conditioned, the signal leads to the anticipation or expectation of pain-injury.

Anxiety is a state of heightened tension with a specific expectation of some pain, injury, or humiliation to one's self or to another. The expectant set of the organism includes not only the skeletal musculature but the visceral organs as well. The expectation is not necessarily conscious; it may be a purely physiological preparation for the impending traumatic stimulus. This principle may be illustrated by reference to the experiment of Blatz (1925), described elsewhere in this book (page 385). Blatz seated his subject in a chair which, without any warning, could be made to fall over backward until stopped by a door-check. After a subject had experienced one fall in this chair his heart rate increased when another fall was anticipated. This was found to hold true in fifteen out of eighteen subjects. There was, we might say, a visceral preparation to meet the impending emergency. The worries of everyday life are of the same nature as this experimental anxiety.

Anxiety plays an important rôle in neurasthenia and in many psychoses. Sometimes there is a prolonged foreboding of harm or injury without any specific reference to a dreaded object. This is called an anxiety neurosis. More commonly, however, the anxious individual finds some object—real or imaginary—for his anxiety, or a whole succession of objects.

Anxiety tension is a very important form of human motivation. Whatever adjustments succeed in reducing the general level of anxiety of an individual are likely to be repeated—reënforsed. And whatever responses raise the level of anxiety are likely to be eliminated from future behavior. The struggle for economic security or the struggle to maintain one's social status is accelerated when something happens to raise the level of anxiety in either of those specific areas.

Motivational Balances and Antagonisms. The second of the three classical principles of emotional expression formulated by

Darwin (1872) was designated the principle of antithesis (pages 53-4). This was described by Darwin as follows:

Certain states of the mind lead to certain habitual actions, which are of service, as under our first principle. Now when a directly opposite state of mind is induced, there is a strong and involuntary tendency to the performance of movements of a directly opposite nature, though these are of no use; and such movements are in some cases highly expressive. [28]

Darwin illustrates the principle in Figs. 2, 3, 4, and 5 and by the following description.

When a dog approaches a strange dog or man in a savage or hostile frame of mind he walks upright and very stiffly; his head is slightly raised, or not much lowered; the tail is held erect and quite rigid; the hairs bristle, especially along the neck and back; the pricked ears are directed forwards, and the eyes have a fixed stare. These actions . . . follow from the dog's intention to attack his enemy, and are thus to a large extent intelligible. As he prepares to spring with a savage growl on his enemy, the canine teeth are uncovered, and the ears are pressed close backwards on the head. . . . Let us suppose that the dog suddenly discovers that the man whom he is approaching, is not a stranger, but his master; and let it be observed how completely and instantaneously his whole bearing is reversed. Instead of walking upright, the body sinks downward or even crouches, and is thrown into flexuous movements; his tail, instead of being held stiff and upright, is lowered and wagged from side to side; his hair instantly becomes smooth; his ears are depressed and drawn backwards, but not closely to the head; and his lips hang loosely. From the drawing back of the ears, the eyelids become elongated, and the eyes no longer appear round and staring. [50-51]

Hostile behavior in the cat presents a contrast to that in the dog. When the cat is threatened, she arches the back in a surprising manner, erects the hair, opens the mouth and spits. This familiar response indicates terror or, at times, an emotion which combines terror with rage. The response of pure hostile attack is seen when two cats are fighting each other or when a cat is being plagued by a boy. In hostile attack the animal assumes a crouching position, in which the body is extended. The tail or just the tip is lashed or curled from side to side. The hair is not erect as it is in fear. The ears are pressed backward; the mouth is partly opened, showing the teeth; the forefeet occasionally strike out with protruding claws; the animal utters a fierce growl. All these responses are preparatory to actual attack upon an enemy.

The bodily set of a friendly cat is directly opposite to that of a hostile animal. The friendly cat stands upright with her back slightly arched. The hair appears to be rough, but it does not bristle. Her tail is stiff and stands straight up; her ears are erect and pointed; her mouth is closed. She rubs against her master with a purr instead of a growl.

Friendly behavior is the antithesis of hostile attack, appearing when hostile attack is inhibited or counterbalanced. Darwin regarded antithetical expressions (such as friendly behavior) as useless, but he suggested that they are serviceable so far as they communicate friendliness to other animals. We might add that they are also useful in releasing tensions. Thus, they have social utility and a certain degree of organic usefulness, too. The neural organizations for friendly behavior and for hostile attack are always present, but the two integrated patterns are opposite and incompatible.

There is at the higher neural levels a balance or equilibrium of determinations akin to the relationship which Sherrington (1906) described on the spinal level as "reciprocal innervation." When an extensor muscle contracts, its antagonist actively relaxes; and when a flexor contracts, the tonic innervation of the opposed extensor is inhibited. The muscular systems of the whole body, in fact, are organized in pairs of opposed groups. Just as one cannot move the eyes to the right and to the left simultaneously or swing the leg forward and backward at the same time, so hostile attack and friendly behavior are opposite and incompatible responses.

Other instances of antithesis can be found in the complex social attitudes of man. For example, attitudes of courage and bravery are built into the individual through social training. These attitudes are directly opposed to the basic impulse to escape from danger. If pain or injury or discomfort is threatening, the primitive impulse is to run away. The courageous man, however, enters the burning house or jumps into the foaming ocean to make a rescue; in battle he fights on despite an injury; or he endures the desert heat to reach a friend. One cannot at the same time accept a threatening situation and escape from it. Consequently, in terms of human values, there is an incompatibility between courageous and cowardly conduct. Courageous behavior implies the facing of danger; cowardly behavior, avoiding it.

A similar antagonism exists in the sphere of sexual behavior.

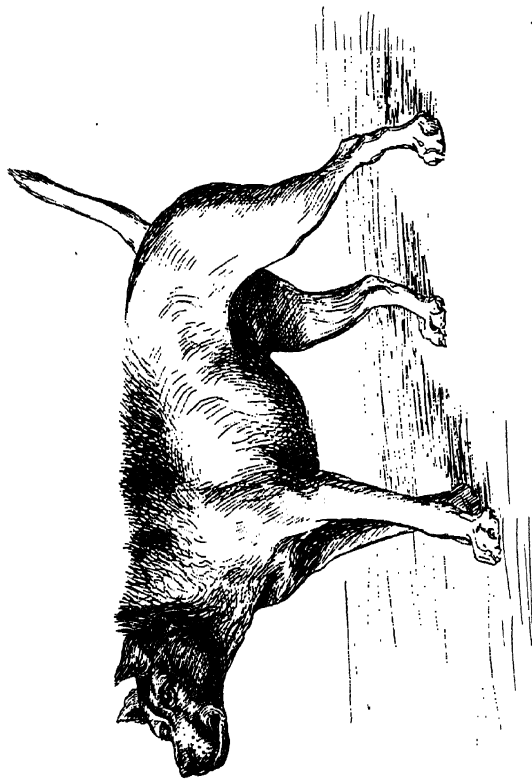


FIG. 2. EXPRESSION OF HOSTILITY IN THE DOG. (After Darwin, *The Expression of the Emotions in Man and Animals*.)



FIG. 3. EXPRESSION OF FRIENDLINESS IN THE DOG. (After Darwin, *The Expression of the Emotions in Man and Animals*.)



FIG. 4. EXPRESSION OF HOSTILITY IN THE CAT. (*After Darwin, The Expression of the Emotions in Man and Animals.*)



ENDLIN: IN THE CAT. (After Dara Th. n of the Emoti in Man and Animals.)

FIG.

Promiscuity is opposed, in our civilization, by ethical standards of chastity and monogamous marriage. In psychological terms this means that an urge for promiscuous sex expression is blocked by opposing inhibitions based upon a desire for the esteem of the social group, upon a fear of venereal diseases, and upon an acceptance of the ideology of monogamous marriage with its special satisfactions and its restraints. There is thus a conflict between a fundamental biological urge, on the one hand, and sex-inhibiting attitudes, on the other. This conflict may be satisfactorily resolved through redirection of the biological urge into channels of indirect expression acceptable to the culture of the social group. On the other hand, it may become the source of emotional disturbance and even of neuroses.

Sex-inhibitory attitudes sometimes overbalance the sex motive to such an extent that prudery appears. Prudery is the negation of sex. Prudish behavior is the opposite of natural and spontaneous sexual activity. The prude is easily shocked by situations which an emotionally balanced individual does not find objectionable. The prude, in extreme cases, acts as if he or she were denying the existence of sex in the world.

Another motivational balance which is important, especially in social psychology, is that between self-display, including self-assertion and expansiveness, on the one hand, and self-abasement or subjection, on the other. McDougall (1926) more than any other contemporary psychologist has stressed the self-regarding motives. Self-display and self-assertion, he writes, exist in the behavior of children. The child will act so as to draw attention to himself. Frequently he will command, "See me do this," "Watch while I do so-and-so," "See how well I can turn a somersault." Adults are less obvious in calling attention to themselves, but whole segments of adult behavior can be epitomized by the words, "Here am I! Look and admire!"

Successful self-display is experienced as pride, self-confidence, and assurance. When self-display is unsuccessful, there are likely to be feelings of shame or failure or inferiority. McDougall, to describe these feelings, has used the terms *positive* and *negative* self-feeling.

Many further illustrations of motivational balances can be found, especially when one takes account of the fundamental biological motives. Several examples are given below of motivational balances and antagonisms which have a physiological basis.

Anderson (1938, 1940) has shown that timidity and sexual drive are inversely related in male rats, and that female rats are less timid when they are sexually receptive than when non-receptive.¹ The inverse relationship between timidity and sexual drive was not significantly altered by removal of the gonads. Anderson suggests that possibly the pituitary gland plays a major rôle in determining the strength of sexual drive because it is known that the pituitary gland secretes at least two hormones which influence the sexual glands.

Other antagonistic relationships have been described by Cannon (1929), who pointed out that a reciprocal relation exists between the bodily processes aroused through the sympathetic and those aroused through the parasympathetic nerves. The sympathetic nervous system is active in the emergency reactions of fear, rage, great excitement, and pain. The parasympathetic nerves regulate conserving and life-building processes such as digestion and reproduction. The antagonism between sympathetic and parasympathetic processes is revealed in the following examples.

During fear and anger the digestive processes are inhibited: the secretion of gastric juice is diminished and the movements of the stomach are checked. Subjectively, the hunger pang vanishes when strong fear or anger is aroused. Hungry persons, when suddenly confronted with grave danger, report that the hunger disappears when they experience fear.

Similarly, the sexual urge is incompatible with the emergency reaction. The behavior in sexual love and that in anger do not coexist. This physiological antagonism is the basis for the incompatibility between the attitudes of love and hate. A man may have a bivalent attitude toward his mate, loving her at one time and hating her at another, but the love and hate do not rise simultaneously.

Other well-recognized antagonisms are: (1) that between hunger and the disgust aroused by a foul food object or an offensive topic of conversation while eating; (2) that between fatigue and the energized state which develops in an emergency and is associated with marked adrenal secretion; (3) that between nausea and fear. An

¹ Timidity was measured by determining the time required for the animal to leave an enclosure or the nest and by counting the number of fecal boluses passed by the animal when placed in a strange environment.

example of the last-mentioned antagonism is the experience of many persons at sea who are seasick in stormy weather until the storm becomes severe enough to be dangerous, when fear quickly cures their seasickness.

Thus there are various pairs of counterbalanced motives. If a motivational balance swings to one side or the other, it is impossible for the opposite pattern of behavior to become integrated at the same time.

CONCLUSION

To the layman the term *emotion* commonly designates attitudes such as love, hate, fear, resentment, and disgust, or motives such as the determination to attack, to run from danger, to seek a mate. The psychologist distinguishes between emotions and attitudes, but recognizes that the two are intimately related. On the one hand, many attitudes predispose the individual to emotional upsets, and, on the other hand, an emotional upset may leave the individual with changed attitudes.

An attitude is a predisposition within the individual to respond in a particular way to some object or situation. Attitudes direct the course of behavior. They may be regarded as motivators of behavior, not in the sense of initiating action but by guiding activity into certain channels. Attitudes differ in *kind*. The various attitudes predispose the individual toward different forms of behavior. Attitudes also differ in the *degree to which they motivate behavior*.

A motive is defined as any factor which initiates bodily movement or which sustains or changes the course of an activity. This broad definition is valid regardless of the point of view from which the process of motivation is described. One psychologist describes motivation in terms of response to persistent stimuli; another describes the process in terms of inner mental tension; another, in terms of the social situation. Regardless of differences in theoretical interpretation, motivation is for all psychologists a process of arousing, sustaining, or changing the course of behavior.

Measurements of attitude are ambiguous so far as motivation is concerned. From the results of an attitude test we cannot predict with certainty what a person will do. In order to predict and control behavior we must take account of all motives, both external and internal, as well as of latent attitudes and other forms of organization

within the individual, for example, habit organization and chemical constitution. In view of the ambiguity in measurements of attitude, it is wise to regard such measurements as indicators of ideology and of stereotypes rather than of motivation.

An organic set, whether it is outwardly observable as a bodily posture in preparation for a specific action or solely an inner determination to respond in a particular manner, is a factor which motivates the individual. It also directs the individual toward his goal in the sense that it keeps him on his course of behavior until a consummatory response is made. Such a determination to act not only integrates the skeletal muscles in carrying out purposive behavior but also controls the functioning of smooth muscles and glands. The organism responds as a whole.

Behavior is regulated in part by motivational balances and antagonisms. Friendly behavior is the antithesis of hostile attack. Attitudes of courage and bravery are directly opposed to the basic impulse to escape from danger. Sexual motives are often blocked by a desire for the approval of the social group. Similar antagonisms are implied in the following pairs of words: *love-hate*, *liking-disliking*, *interest-aversion*, *fear-courage*. In behavior these opposing attitudes and motives are continually being balanced.

An analysis of the attitudes and motives of an individual is basic for a sound understanding of his feelings and emotions. Such analyses are fundamental also to the science of psychology as a whole. Attitudes influence what we *do* as well as what and how we *feel*. They also determine how we *observe*, for the attitude of an observer may definitely determine what he does and does not perceive. The analysis of attitudes, in fact, is a significant approach to the study of the whole psychological individual. This way of analysis we have called the *attitudinal approach*.

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READING SUGGESTIONS UPON ATTITUDES AND THEIR MEASUREMENT

There is a large literature dealing with attitudes and with attitude measurement. For general orientation in this field the reader is referred to the excellent summary by G. Allport (1935). A few other references, arranged chronologically, are: Stagner (1941), Bird (1940), LaPiere and Farnsworth (1936), G. Watson (1935), K. Young (editor, 1931). The book by Albig (1939), written from the standpoint of a sociologist, is an important contribution to the field. For orientation in the problems, methods, and results of attitude measurement the following works will be found useful: Bird (1940), Katz (1937), Kirkpatrick (1936), Droba (1932), Likert (1932), Sherman (1932), Thurstone (1932 and 1928). The pioneer study in the modern field of attitude measurement is that of Thurstone and Chave (1929).

Note upon the canals of Mars

Discussion of the canals upon Mars is based upon portions of the following works: E. M. Antoniadi, *La Planète Mars, Étude basée sur les Résultats obtenus avec la grande lunette de l'observatoire de Meudon et exposé analytique de l'ensemble des travaux exécutés sur cet astre depuis 1659* (Paris: Librairie scientifique Hermann et Cie, 1930). A. E. Douglass, Is Mars Inhabited? *Harvard Illustrated Magazine*, 1907, 8, 116-118. P. Lowell, *Mars* (New York: Houghton Mifflin, 1895; pp. x + 217); *Mars and its Canals* (New York: Macmillan, 1907; pp. xv + 393); *Mars as the Abode of Life* (New York: Macmillan, 1908; pp. xix + 288). E. S. Morse, *Mars and its Mystery* (Boston: Little, Brown and Co., 1907; pp. xi + 192). W. H. Pickering, The Planet Mars, *Harvard Illustrated Magazine*, 1907, 8, 115-116. A. R. Wallace, *Is Mars Habitable?* (London: Macmillan, 1907; pp. xiii + 110).

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CHAPTER III

NEEDS AND APPETITES, THE BASIS OF THE AFFECTIVE LIFE

The causation of emotional disturbance can be fully understood only in relation to the attitudes and motives of the individual who experiences the emotion. The relation of emotion to these factors is very close. On the one hand, the attitudes and motives of an individual in good part determine what particular emotion he will experience in given circumstances. On the other hand, emotional disturbances leave their marks upon the individual in the form of changed attitudes and motives. These principles were brought out in the foregoing chapter.

No survey of motivational processes is complete which ignores the basic appetites and the biological needs upon which they rest. Consequently, we shall examine, in the present chapter, some of the needs and appetites of man and animal.¹

It should be made clear that appetite is one of the underlying factors in the affective life. Appetites are the basis of a large group of organically determined desires and in the satisfaction and frustration of these appetitive impulses arise feelings of comfort and discomfort, as well as emotional upsets. Examples of fundamental appetites are those which lead the individual toward food, water, air, mate, sleep, rest, and elimination.

Appetites and emotions are intimately related in that both rest upon organic processes, including changes in the viscera. One of the main differences is that emotions arise from the psychological situation, especially some environmental event, while appetites arise from the intraorganic state. Another difference is that emotions are more disorganizing—both of behavior and emotional experience—than appetites are. Cannon has discussed appetitive states (hunger, thirst) and aversive states (pain) in the same book with emotions (fear,

¹ There are, of course, needs and appetites other than those mentioned in this chapter. The present material should be considered as illustrative rather than as a systematic survey of needs and appetites.

rage), and rightly so, for these processes are intimately related from the physiological point of view.

In everyday life we speak of *feelings* of hunger, thirst, fatigue, sleepiness, pain, and the like, and we do not regard these experiences as true emotions. If there is an external origin to the disturbed process—as in meeting a bear, receiving an insult, reading of the death of a friend, listening to a joke—we use the term *emotion*.

In this chapter we shall continue the analysis of motivation in two directions. First, we shall consider the way human needs are met in various cultures. Second, we shall turn to the problem of relating bodily needs to those appetites of man and animal shown in the selection of foodstuffs. After considering the illustrative material, we shall define the terms *need*, *appetite* and *aversion*, *drive*, *desire*.

HOW PRIMITIVE MAN MEETS HIS NEEDS

In building a brick wall, the mason *needs* mortar. When an artist paints a portrait, he *needs* canvas and pigments. If an organism is to survive, it *must have* oxygen, water, protein, fat, carbohydrate, mineral salts, vitamins, a moderate range of external temperature. *Need* is always a requirement for some result. Where need exists, it is a need *of* something *for* some end or goal.

Primitive man acts to meet the biological requirements of his existence even though he has but hazy understanding of their nature. Beautiful illustrations of this principle can be drawn from the field of anthropology.¹

Actinic Rays and Vitamin D. Within recent years it has been discovered that the actinic rays (those that produce chemical action, especially the violet and ultra-violet rays) of the sun aid in the manufacture of vitamin D in the human body. These rays filter through bodily skins of a light color, but darker skins serve as insulation against them.

In tropical regions the quantity of actinic rays transmitted through the atmosphere is enormous indeed, whereas, toward the polar regions, the concentration of these rays diminishes rapidly. Within the arctic circle very few actinic rays filter through the atmosphere and

¹ Of the following eight illustrations, the first six were brought together by Dr. C. S. Ford, of Yale University, who has kindly permitted use of his materials. Dr. Ford's copy has been changed in some minor respects to meet present purposes.

reach the inhabitants. The rays of the sun, which meet the earth's surface at right angles in the tropics, are very slanting at the poles, and this is an important factor in determining the concentration of actinic rays.

An excess of actinic rays means an excess production of vitamin D, which, in turn, leads to nervous disorders such as neurasthenia; while lack of the rays—unless vitamin D is supplied in some other way—is conducive to rickets. The illnesses resulting from excess of vitamin D or from its deficiency, although injurious to tissues and depleting to strength, are not ordinarily fatal. They do, however, hamper child-bearing. It follows, therefore, that darker-skinned people have a better chance of reproducing in the tropics than those with lighter skins; and lighter-skinned people are better able to perpetuate their kind in the arctic circle.

But in the North there are some relatively dark-skinned people. How, then, do they persist? In seeking an answer to this question it was discovered that the Eskimos, although they cook some of their food, follow the custom of eating raw fish. The practice, according to vitamin experts, supplies them with the necessary vitamin in a form not dependent upon actinic rays for its effectiveness.

Turning now to tropical and semitropical regions, we find some relatively light-skinned people. With them, protection from the sun's rays has been through artificial insulation in the form of clothing. The turban of the Moslem, the Turkish fez, the hooded veil of the Tuareg people who inhabit the Sahara, for example, all prevent an excess production of vitamin D. Yet none of these people, probably, is any more aware than are the Eskimos of the relationship between its headdress and the meeting of its need for a controlled amount of vitamin D.

These and many other well-known examples show how customs exist which serve to adjust peoples to their environment and which permit reproduction of their species even under very adverse conditions. The customs have developed in the absence of any scientific understanding of the need which they meet.

Climatic Conditions. All over the world men have protected themselves against the extremes of cold and heat. An excellent illustration is afforded by the Polar Eskimo dwelling.

In the arctic circle existence depends upon a highly developed

adjustment to climatic and geographic conditions. The temperature averages 34° F in the summer, 16° F in the autumn, —11° F in the winter, and —7° F in the spring. Snow falls every month of the year but especially in the spring and autumn.

The winter house, usually situated on the sloping beach just above the ice foot and overlooking the sea, represents an ideal adjustment to the climate and to the available materials.¹ The typical house accommodates one or two families.

The main part of the dwelling is pear-shaped, wider in front and narrower behind. In dimensions it rarely exceeds twelve by ten feet, with an internal height insufficient for an average man to stand erect. No wood, bone, or ice enters into its construction. Heavy stone walls support cantilever beams of stone, upon which rest flat slabs of slate. The whole is covered with earth and an outer layer of stones. This marvel of engineering is entered by a low-semi-subterranean tunnel, ten feet long, lined and covered with stones and turf, and protected at the entrance by a wall of snow. The tunnel opens into the single room of the dwelling by a narrow door less than two feet in height. The floor, nearly level with the roof of the tunnel, is restricted in area, paved with stones, covered with grass and skins, and flanked by raised platforms on both sides and on the rear. In front, over the door, a window overlooks the sea. It consists of a skin, in which is inserted a square pane of animal membrane with a tiny peephole in the center. . . . The small platforms on either side of the floor hold food and household articles. On each stands a blubber lamp, over which are suspended a cooking pot and a frame for drying clothes. The rear platform, covered with dry moss and bearskins, occupies at least half the room. Here the members of the household sit and sleep, each in his special place, the housewives at the sides within easy reach of the lamps. The problem of ventilation is admirably solved. The air enters through the tunnel in a quiet stream and spreads out over the floor where the temperature is nearly always below the freezing point. It is not warmed until it reaches the level of the lamps, where it streams over the raised platforms. Here the temperature, though constant, is so high that the occupants regularly divest themselves of all clothing except their trousers, the men frequently even these. Under the roof the heat is stifling; the Eskimos therefore assume a reclining position as the most comfortable. However warm the room may be, the air is always fresh and pure, for all fumes and odors escape through the peephole and a tiny opening in the roof. [203-205]

This winter house is amazingly expedient as an adjustment to a rigorous climate. Some of the dwellings in other parts of the world seem less adequate. For example, the Australian aborigines build a

¹ The following description of the Eskimo dwelling is taken with permission from the work of G. P. Murdock (1935), of Yale University.

simple lean-to hut or *wurley* which, from our point of view, is a relatively poor adjustment to a climate in which the temperature often drops to 20° F and rises to as high as 115° F in the shade.

But by and large, people have made relatively good adjustments to climatic conditions with the materials they have had at hand.

From the standpoint of psychology, this kind of adjustment is easily understood. Each activity which increases the comfort or decreases the pain experienced by individual members of society is likely to be repeated. Successful methods of constructing dwellings are retained by members of the group and become established as customs.

The Cooking of Food. The cooking of food is an almost universal custom. Despite the labor involved and the frustration through delay imposed by the extensive preparation of food, cooking is quite generally regarded as a necessary preliminary to consumption.

The advantages of cooking must be but poorly understood by the people themselves. To the physiologist they are better known. Cooking amounts to a sort of predigestion. It breaks up and softens foods to a greater degree than milling or even chewing. Although a few foods are less digestible cooked than raw, on the whole a raising of the temperature of food in the presence of moisture amounts to a shortening of the processes which precede intestinal assimilation.

Cooking thus makes the nutrient properties of food more available for body use by their more complete digestion. Also, cooking makes foods more appetizing (this is especially true of meats), increasing the flow of gastric juice and making the individual want to eat more. In these ways the cooking of food helps to build up the energy reserves of the organism, freeing them for activities other than the digestion and assimilation of food. Moreover, cooking has the additional advantage of destroying harmful bacteria that may be living in raw foods. Though all this is obvious to modern science, it is not so obvious to primitive peoples. Finally, in all the ways just described, cooking provides food better suited to the needs of infants and young children. The practice lessens infant mortality.

Apparently the practice of cooking food has been found, through trial and error, to be advantageous in the struggle for existence and—perhaps on account of its biological advantages—has received the sanction of the mores of the group.

But this must not lead us to think that cooking is advantageous

in every respect. Under modern conditions cooking destroys some of the vitamins which are needed for the adequate nutrition of the body. These vitamins must be supplied through concentrates or in other ways.

Infant Care. Among primitive peoples, except where the infant is deliberately put out of the way, he is given exceptionally good care during the first week after birth. In many societies he is completely isolated from contact with all other members of the group, with the exception of the mother and a few elderly women who take care of both the mother and her child. This seclusion is commonly terminated with the dropping off of the umbilical cord, which occurs, among some primitives, between the third and the seventh days after birth.

From the medical standpoint, there are good reasons for such care of infant and mother. Until the navel has healed and the cord has come off, there is danger of infection. Further, the newborn infant is in great need of rest and warmth while making a profound biological adjustment to living in the outer world. The functions of respiration, temperature regulation, and food ingestion are all becoming established for the first time in a new environment.

It is a recently discovered medical fact that vitamin K, which is one of the factors regulating the coagulation time of the blood, is deficient in the normal infant during the first five or six days of life. This means that there is more danger from bleeding during the early days of infancy than later. In this connection it is worthy of note that although infant mutilations are common among primitive peoples, those involving the possibility of bleeding are not performed until after the first week of life. Circumcision, too, is not ordinarily performed during the first few days.

There are doubtless other biologically sound reasons for the isolation and care which the newborn infant receives, but primitive man explains the matter differently: A spirit mother hovers nearby to snatch the soul of the infant if it is not carefully hidden, or perhaps someone with an evil eye may harm the baby. The practices are biologically useful despite the explanation given.

Storing Food against a Future Shortage. Another practice of obvious utility is the storing of food as a precaution against times of drought and natural disaster. Although the Bushmen of South

Africa, the Australian aborigines, and the Veddas of Ceylon hardly ever hoard for the future, most primitive peoples throughout the world store food for their future wants. The Hopi Indians, for example, store a reserve supply of corn for two years.

In Fiji, Dr. Ford reports, the community ate yams that had been stored for a year, and the yams from the new harvest were stored in their place. When questioned about the practice, the natives explained that the chief made them store a certain proportion of yams for each person—regardless of how poor the crop was. In support of the wisdom of this procedure they cited the hurricane of '31 and pointed out that all would have perished had not the chiefs for many years past forced them to conserve their food supply in this way.

To store food for future use imposes a self-denial which may be contrary to the wishes of certain members of the group. For example, among some of the New England Indian tribes the women had to hide the seed corn from the men lest they devour it all. This is a case in which some individuals are forced by the tribal mores to subordinate their biological impulses to the survival needs of the group.

The storing of food is supported in various ways: by ceremonial rites in times of plenty, by the authority of the chief, by the desire of certain individuals to obtain prestige through acquiring property. But it is really danger of starvation which is being combated by this practice.

Although the utility of food storing as a means of meeting biological needs is obvious to us, and to some primitive peoples as well, there are those who conform to the group practices without understanding their biological significance.

Avoiding Contact with the Dead. Among primitive peoples there is a widespread conviction that the ghost of a man who has died is dangerous. Fear of ghosts is shown by practices which aim at warding off the danger with which the dead threaten the living.

One technique for avoiding the ghost is that of attempting, by various magical practices, to recall the dead to life; if the ghost re-enters the body, it is no longer a source of danger. But the commonest custom of all, one which is almost universal, is to avoid contact with the ghost. Avoiding contact with the ghost is accomplished by avoiding contact with the corpse.

In some societies this is carried out by every member of the group.

Among the Veddas, for example, the body of the dead man is left lying in a cave, and the tribe moves to another location to resume its living. But in the majority of social groups certain individuals handle the dead, burying, burning, or otherwise disposing of them. By various procedures the attempt is made to prevent the return of the ghost.

There is also the custom of taking a corpse out of the house through a hole in the wall or some other unnatural exit which is thereafter blocked up—the theory being that the ghost will be unable to find his way back. Keeping silence is another way thought to avoid the return of the ghost; not to mention his name is another.

But, to come back to the persons who act as undertakers, we find almost universally that they are obliged to purify themselves after handling a corpse. Very rarely are they allowed to return to normal group life until they have thoroughly washed and purified themselves. In some societies they are forbidden to handle food until extensive and prolonged purification ceremonies have been carried out.

Our modern sciences of pathology and bacteriology make it clear that there are real dangers of infection from a decaying corpse. The human body in a process of dissolution can be a source of disease. Thus there are genuine advantages in the self-imposed quarantine of primitive peoples.

But to assume that primitive man has an understanding of disease transmission is to miss the point. Illness and death (in these cases) are explained by him in terms of the return of a vengeful ghost and not in terms of pathology or bacteriology.

Tea Drinking in China. That tea drinking is a universal custom in China is well known. A laborer will carry along his pot of steaming tea in its well-padded “cozy” unless the liquid can be obtained where he is working. Along the road are countless places for getting tea. In temples the Chinese will leave the ceremonies from time to time to sip their tea. They do not drink water at all but take all their liquid (except what is in their food and their wine) exclusively in the form of tea. The Chinese insist that tea must be taken very hot, and actually they often drink it at temperatures which the uninitiated foreigner cannot tolerate.

This practice of tea drinking is so ancient that no one knows where it started or how.

The fact is that the water in thickly populated parts of China is usually unsafe, being contaminated with typhoid or cholera germs or other dangerous bacteria or with an amoeba which is the source of dysentery. Americans traveling in China are warned to boil their water before drinking it as a precaution against bacteria and amoebae.

But the masses of the Chinese know nothing of bacteriology and infection. The more intelligent ones realize that tea is safer to drink than water but do not realize that it is the *boiling* of the water rather than the tea itself which makes the liquid safe to drink. They believe, too, that tea must be taken very hot to be safe, not realizing that cold water which has been boiled is equally safe.

Here, then, is an instance of a universal custom which meets an important need and which is carried on without an appreciation of its hygienic significance.

The Meeting of Sexual Needs in a Primitive Society. The Trobriand Islanders of north-eastern New Guinea (or north-western Melanesia) are an interesting group to study because they are ignorant of the facts of physical paternity. According to the anthropologist Malinowski (1927), the natives, although they know in a general way that a virgin cannot conceive, have no idea whatever of the fertilizing influence of the male semen. Children, in native belief, are inserted into their mother's womb as tiny spirits, generally through the agency of the spirit of a deceased kinswoman of the mother.

Kinship is recognized only through the mother, *i.e.*, kinship is matrilineal. The mother's brother exercises a good deal of the authority which, with us, is assumed by the father. He requires obedience of his sister's child and, especially with a boy, cultivates traits of ambition, pride and social worth which go to make life meaningful for the Trobriander.

Now this ignorance of physical paternity carries with it a lack of all sense of moral responsibility for the procreation of children. So sexual impulses, from infancy to maturity, are given uninhibited expression much as they are with animals. Throughout the lifetime, the development of sexuality is free from repression, censure, and moral reprobation. For this reason the Trobrianders well illustrate, in their practices, the meeting of sexual needs in a primitive society where scientific knowledge of reproduction does not exist.

At the ages of five to seven the children in the Trobriand archi-

pelago begin to form small groups within the community. These juvenile groups roam about in bands, play on distant beaches or in secluded parts of the jungle. In all this, though they obey the commands of their child-leaders, they are relatively independent of the authority of their elders. They gradually become emancipated from the supervision of their families.

At an early age these children are initiated by each other, or sometimes by a slightly older companion, into the practices of sex. Usually they content themselves with various games in which the dominating interest is genital. In the more elaborate husband-and-wife games sensual pleasure alone does not seem to satisfy them; it must be blended with some imaginative and romantic interest. The parents take these plays for granted and do not look upon them as in the least reprehensible.

At the age of puberty in most primitive societies, initiation rites are performed which serve to train the youth in adult sexual practices but which completely mask the normal biological developments of the period. The Trobrianders, however, have no such initiation ceremonies.

During adolescence there is a period of general promiscuity, but eventually every man and woman in the Trobriands settles down to matrimony, which is usually monogamous except for chiefs, who have several wives. In marriage the girl goes to join her husband in his house, migrating to his community. Matrimony is a permanent union, involving sexual exclusiveness, a common economic existence, and an independent household.

In a Melanesian home the mother invariably shows a passionate devotion to her child, and the surrounding society fosters the maternal inclination and idealizes it by custom. The father, too, plays an active rôle in the physical care of the children. He is obliged to protect and cherish them, to "receive them in his arms" when they are born; but they are not regarded as his in the sense that he has had a share in their procreation.

Thus, among the Trobriand Islanders the biological needs of sex and reproduction are met in a way which is free from all restraint, by people who are ignorant of the basic facts of biological science.

Concluding Statement. The foregoing illustrations were selected to make clear one basic principle: Primitive man somehow

manages to meet the basic needs or biological requirements of his existence—growth, reproduction, and physical well-being—even though he lacks a scientific understanding of the reasons for his conduct. The savage may explain in terms of ghosts or evil spirits, the man of science in terms of bacteria or vitamins; but both continue to carry out their adjustive activities. Innumerable customs and taboos have grown up in primitive societies as aids in meeting biological needs.

Although this proposition is true in general, there are some primitive customs and taboos which are directly opposed to the meeting of biological needs. For example, in ceremonial dances the men may continue to dance until they drop exhausted; or widows may be put to death at the time of their husbands' demise. Again, the head-binding of infants and the various mutilations of face and body (practices required by the mores of some peoples) have no biological utility. Hence, although group practices do in general tend to meet the requirements of existence, this principle is not a universally valid one.

Nevertheless, it should be stated in a positive way that primitive behavior tends to meet the cultural standards of the group. By and large, the cultural requirements do minister to the various needs of individuals within the group. The fact that man has survived, that we are here today, is sufficient evidence for the truth of this general proposition.¹

BODILY NEED AND APPETITE

Cannon (1932) has restated Claude Bernard's principle that the body maintains relatively constant internal chemical and physical states despite changing environmental conditions. The blood is approximately constant in its content of water, salt, sugar, protein, fat, calcium, and oxygen. The internal temperature of warm-blooded animals is remarkably constant. With man the normal temperature varies only slightly from 98.6° on the Fahrenheit scale; and so constant does it remain that departure of a few degrees from this norm is regarded by the physician as a symptom of disorder.

This conception of a relatively constant physicochemical state or

¹ In a chapter discussing personality needs and frustrations Prescott (1938) makes the statement that the needs of developing children naturally fall into three categories, representing three major aspects of the life of a person: (1) physiological needs; (2) social or status needs; (3) ego or integrative needs. This classification merits careful study.

homeostasis, as Cannon called it, furnishes a sound basis for the objective definition of bodily need. To maintain a homeostasis of water the animal *needs* to obtain water from its environment. To maintain a homeostasis of salt the organism *needs* to find this substance, and so on.

Although there are within the body mechanisms for storing water, fat, protein, carbohydrate, calcium, and other substances and for releasing them into the blood as required to maintain homeostasis, the internal supply of these food elements sooner or later becomes exhausted. In order to survive, the animal must ingest those foods which are necessary to maintain a stable internal physicochemical state.

In an objective sense the organism *needs* or requires certain foods to survive. Survival is an objective criterion of *need*. But there are other criteria. An organism may survive, yet fail to grow. It may grow, yet fail to reproduce. It may reproduce and still have low resistance to attacks of bacteria. An organism which can normally resist bacteria may still be inactive or slow to learn. It would be possible to use any one of the following as a criterion of biological need: survival, growth, reproduction, resistance to bacteria, learning. The *needs* of an organism are simply the requirements which must be satisfied in order to meet any or all of these criteria. *Need* can thus be defined in terms of objective conditions.

Distinct from *need*, though related to it, is the psychological conception of *appetite*. Broadly considered, an appetite is an organic state based upon some need. It is characterized by an increase or decrease in the level of general activity (restlessness or quiescence) and by an inclination to carry out some specific activity which tends to restore homeostasis. Examples of appetites and the goal responses which restore homeostasis are these:

<i>Appetite</i>	<i>Goal Response</i>
Hunger.	Food ingestion.
Thirst.	Water ingestion.
Air hunger.	Air intake.
Sexual appetite.	Copulation.
Eliminative appetites.	Urinating and defecating.
Fatigue.	Resting.
Sleepiness.	Sleeping.

Appetites range in degree from weak to intense. They recur and often reveal a fairly uniform cycle which depends upon recurring needs within the organism.

Examples of Specific Appetites. In a more restricted sense of the word, to which the writer will hold in the following sections, an appetite may be defined as a specific hunger for some substance: water, the various foods, oxygen. There are also abnormal appetites such as that for morphine and other habit-forming drugs. These specific appetites are revealed both in behavior and in the conscious cravings of an individual.

To illustrate the nature of specific appetites the following examples are given. Some of them occur under normal and others under abnormal conditions.

Air Hunger. The body has no means for storing oxygen as it has for storing protein, fat, carbohydrate, water, minerals, and certain other substances which are essential to life. The biological explanation of this fact is probably that air-breathing animals are so constantly surrounded by air that no necessity exists for them to store oxygen within the body. When, however, a man is trapped beneath the water or in a room filled with injurious fumes, the need for air is all too obvious. He struggles to reach the air, and his failure to do so will result in speedy death.

Anatomically, the respiratory apparatus is so distinct from the structures of the alimentary tract that air hunger has been regarded as an appetite different in kind from the cravings for solid food and for water. Fundamentally considered, however, air hunger is just one of the group of normal appetites.

Thirst. Cannon (1934) described the experience of thirst as a condition of dryness in the mouth and throat region. Subjectively, thirst is referred to the inner surfaces of the mouth and throat, especially in the root of the tongue and to the back of the palate. The subjective experience, in severe cases, is highly unpleasant. The mouth is perceived as dry or sticky. During intense thirst the tongue cleaves to the teeth or to the roof of the mouth. A lump seems to be present at the back of the throat, where it remains despite repeated attempts to dislodge it by swallowing.

Mild thirst can be temporarily relieved by moistening the mouth

and throat or by placing against these parts a dry rubber sac containing ice. But such measures bring only brief respite from the discomforts of thirst.

In a significant experiment, Bellows (1939) made use of a sham-drinking technique by means of which water was passed through the mouth and pharynx of dogs and thence outside the body in a tube. Sham drinking moistened the mouth and throat of the animal and thereby brought temporary relief from thirst, indicated by the fact that the dog would momentarily stop drinking. But when a quantity of water (equal in amount to the water deficit of the body) was introduced by tube directly into the alimentary canal, a more permanent satisfaction of thirst appeared ten to fifteen minutes after introduction of the liquid.

In other words, in thirst the bodily need for water is a general one, which can be met only by supplying the tissues with the needed liquid through drinking or in an equivalent way.

In addition to air hunger and thirst, there is general hunger for food, which can be factored into a group of appetites for specific food elements—fats, proteins, carbohydrates, the different mineral salts, and the vitamins. Normal appetites are sometimes transformed into abnormal cravings when the body is deprived of an essential substance for a long time. A study of some of these abnormal cravings demonstrates the existence of the separate food appetites and shows that they are independently variable. Examples of some abnormal cravings will follow.

An Example of Unusual Salt Hunger. There has recently been described the case of a boy who had an unusually strong hunger for salt which persisted until death at the age of three and a half years. During his life he ingested great quantities of salt.

When about a year old, he started licking the salt off crackers and asking for more. He would chew soda crackers until he got the salt off and then spit them out. Although he didn't speak at this time, he had a way of letting his parents know what was wanted. At eighteen months, he started to say a few words, and *salt* was among the first that he learned. Practically everything that he liked very well was

salty: crackers, pretzels, potato chips, salt mackerel. His foods were all very much saltier than those of his parents and, in addition, he ate about a teaspoonful of table salt per day. He drank large amounts of water and showed a marked preference of water to milk.

At the age of three and a half this boy was admitted to the Harriett Lane Home for Children and placed upon the regular diet of the ward, which contained only a normal amount of salt. As a result of salt deprivation, seven days after admission he suddenly died. Post mortem examination, according to Wilkens and Richter (1940), revealed deficient tissue in the cortex of the adrenal glands.

This finding is significant because it is known from laboratory experiments that, if the adrenal glands of rats are surgically removed, the animals die within ten to fifteen days when maintained on the ordinary stock of laboratory diets. Death occurs largely because of excessive loss of salt through the urine. But the survival time of these adrenalectomized rats can be increased by adding sodium chloride to the diet until it approximates the amount of salt lost in the urine. Further, it has been shown that, if adrenalectomized rats are given free access to a salt solution, they ingest large amounts of it. As a consequence, they keep themselves alive indefinitely and free from the symptoms of insufficiency.

Apparently the boy with deficient adrenal glands had kept himself alive by ingesting great quantities of salt. The boy's appetite was an accurate index of his bodily need.

Phosphorus Hunger and "Depraved Appetite." In certain areas of South Africa and also in some parts of the United States the soil is deficient in phosphorus as well as in other mineral elements. Consequently, cattle of these regions are limited to a forage which is deficient in phosphorus.

Green (1925) has described how phosphorus deficiency in the diet gives rise to a "depraved appetite." The cattle eat bones which they find lying on the plains or in the carcasses of animals. It is reported that they become carnivorous to the extent of capturing small animals and eating their bones.

This "depraved appetite" has been produced experimentally in cows by feeding them a diet which is deficient in phosphorus. The

craving for bone, however, is only one symptom of the bodily deficiency (osteomalacia). Other symptoms are loss of weight, stiffening of the joints, softening of the bones, disturbances of reproduction and lactation. Feeding cows bone meal or giving them phosphorus in some other form corrects the disorder and removes the appetite for bone.

As the bodily condition produced by phosphorus deficiency becomes more and more severe the animals grow less discriminating in their choice of foods. A cow not only will eat bone but also will chew wood or eat leather if it can be obtained; or she will pick up and swallow stones, dirt—almost anything. From one standpoint this indiscriminate eating is the mark of a “depraved appetite,” but from another point of view it is nature’s desperate attempt to obtain for the body a much needed dietary element.

An Unusual Appetite for Calcium. When the parathyroid glands are surgically removed, rats ordinarily lose weight, develop symptoms of tetany, and die unless they have access to an adequate supply of calcium.

In one experiment, Richter and Eckert (1937) found that parathyroidectomized rats, when given a choice among a variety of food elements, ingested large quantities of calcium solutions (lactate, acetate, gluconate, and nitrate). The selection reduced mortality to zero, greatly improved the tetany, and eliminated or reduced the loss of weight.

After the removal of the parathyroid glands the appetite for calcium was definitely increased with seventeen out of eighteen rats. The average daily intake of a 2.4 per cent calcium lactate solution was nearly four times as high after the operation as before. Parathyroid implants in five animals caused the calcium intake to return to its normal level.

The experiment shows clearly that the intake of calcium varies with bodily need for that substance. If given an opportunity, the operated animals select calcium and survive.

The Appetite for Vitamin B. If rats are deprived of the vitamin B complex, they develop an overwhelming appetite which is revealed when the vitamin complex is presented in crystalline form or in aqueous solution.

According to Richter and collaborators (1937), vitamin-deficient rats show the strength of their appetite by finding the bottle of vitamin solution immediately when it is placed in the cage, even when as many as twelve other containers filled with different foods and solutions are in the cage at the same time. Once the animals have tasted the solution of vitamin B it is difficult to stop them from drinking it. Attempts to remove the vitamin from the cage are met with fierce resistance. The bottle is held tightly with both paws and even with the teeth. By reaching far up into the bottle, the rats make an effort to obtain every drop of the vitamin solution.

The Independent Variability of Food Appetites. The foregoing illustrations of specific hungers demonstrate the existence of appetites for particular nutritive substances. Hunger, instead of being a general demand for food, can be factored into several partial hungers or appetites. How many nutritive appetites are there?

There is sound experimental evidence for the existence of at least eight independently variable food appetites. These are the appetites for protein, fat, carbohydrate, water, sodium, phosphorus, calcium, and some factor or factors in the vitamin B complex. There are probably other independently variable food appetites which have not as yet been demonstrated in the laboratory—appetites for other minerals and possibly for some other vitamins (although researches upon vitamin D have given negative results).

The intense cravings which addicts show for habit-forming drugs—morphine, cocaine, Heroin, etc.—further illustrate specific and independently variable appetites. This type of craving does not belong in the list of food appetites, of course.

Special aversions should also be considered. Both men and animals show an aversion to putrid meat and certain other spoiled foods. Some dogs have an aversion to dog's flesh as food. Cattle are said to refuse toxic vegetation growing in their grazing lands. In liver disorders an aversion to fat develops.

There are also perversions of appetite, among the more common of which (in animals) are: coprophagia (eating of feces), infanto-phagia (eating of the young), osteophagia (bone eating), the grass eating of dogs and cats when sick. In chlorosis, girls sometimes show a craving for sour and highly spiced foods. In diabetes, the patient may have an intense craving for sugar. Pregnancy is accompanied by

unusual food cravings which vary from individual to individual. In hookworm disease, the patient may indiscriminately eat earth, paper, chalk, starch, hair, and clay.

In view of the available facts it is reasonable to assume that general hunger can be factored into a group of partial hungers or appetites which, within certain limits, vary independently of each other. Actually, the independent variability of certain appetites is not merely an assumption, but a known fact. The evidence for independently varying appetites has been revealed by two types of experiments which are described in the following section.

Self-selection Feeding and Preference Experiments. It has been found that when animals are given a free choice among a variety of food elements, they select a diet which is adequate in calories and balanced with respect to the dietary elements ingested.

In one such experiment Richter, Holt, and Barelare (1938) gave rats complete freedom of choice among eleven pure food elements (three solid foods and eight liquids), each presented in a separate container. The foods were:

Casein (protein)	
Sucrose (carbohydrate)	
Olive oil (fat)	
Sodium chloride, 3%	} Mineral solutions
Dibasic sodium phosphate, 8%	
Calcium lactate, 2.4%	
Potassium chloride, 1%	
Dried baker's yeast	} Sources of vitamins
Cod-liver oil	
Wheat-germ oil	
Water	

Daily measurements were made of the quantities of each element ingested. It was found with self-selection or cafeteria maintenance that the daily quantities of food elements ingested were fairly uniform. With some foods the intake was relatively constant from day to day. Other foods revealed cycles of intake. The daily intake, more-

over, varied with such conditions as pregnancy, lactation, removal of a gland, deprivation of an essential food element.

To illustrate, during pregnancy, according to Richter and Barelare (1938*a*, 1938*b*), under the self-selection feeding system there was a change in the balance or proportions of food elements ingested. The quantity of protein and fat consumed was definitely increased. Also, there was increased intake of sodium and calcium. Rats were observed to take, on the average, more than twice as much sodium chloride solution (3 per cent) in the ten-day period following conception as in the previous ten-day period. Carbohydrate intake did not change appreciably during pregnancy.

Another experimental technique which demonstrates the independent variability of certain appetites is that utilized by the writer in his studies upon food preferences (1941).

In this work the rat is given a choice between two test-foods, which are momentarily presented side by side in a pair of glass tubes. As soon as the rat takes a nibble of one food, both tubes are lowered out of reach. The rat is required to return to the starting box of the apparatus, thirteen inches away, before he is given another opportunity to sample the test-foods. After a few days of habituation to laboratory conditions, the animal shuttles back and forth between starting box and test-foods. Upon each run he gets a nibble of one of the foods. Under these conditions the rat is forced to work (run back and forth) in order to continue eating. His choices between the two foods during the series of brief eating periods frequently indicate a consistent preference of one food to the other.

A preference test lasts ten or fifteen minutes, during which time the right-left positions of the test-foods are interchanged after each trial. The number of runs varies from zero to eight per minute, a well-trained rat often averaging four to six a minute.

Among the findings which throw light upon appetites, food preferences and dietary habits are these:

The Continuum of Demand. At any time, if a rat is maintained upon a constant, standard diet, a group of test-foods arrange themselves in a series such that, when a food, *A*, is preferred to *B*, and *B* is

preferred to *C*, the three form a transitive series: $A > B > C$. This relationship implies that *A* is preferred not only to *B*, but to *C* as well, and to foods less demanded than *C*. This *serial principle* has been demonstrated repeatedly in experiments with animals. It implies that there is—with constant diet and health conditions—a true continuum of demand along which the particular demands for specific food elements arrange themselves.

Development of Food Preferences. When a rat is first placed upon the preference apparatus, there is much random sampling. Later a preference develops. As successive choices continue to be made, one of the two test-foods is selected with increasing frequency. A preferential trend thus appears and may develop to such a point that the animal takes a preferred food in 100 per cent of the trials for a hundred or more consecutive choices. The running activity on the apparatus varies markedly with conditions: amount of practice, kind of test-foods used, period of deprivation, etc.

Reversals of Preference. In one experiment twelve rats were found to show a consistent preference of sugar to whole-wheat powder. Following this, they were fed upon gradually increasing amounts of sugar immediately before each daily preference test. Under these conditions the marked preference the rats had shown for sugar gradually weakened, disappeared, and finally, after two to four days, was completely reversed so that all animals came to prefer wheat to sugar—the opposite of the initial preference.

In another experiment the rats revealed a preference of butterfat to whole-wheat powder. During repeated preference tests they ingested more and more fat, nibble by nibble. Gradually, as they approached satiation upon fat, the demand for butterfat weakened. The original food preference reversed. The reversal in this instance was not brought about by the prefeeding of a test-food, as in the former case. It came about gradually in the natural course of the experiment, as satiation upon fat occurred and the animals learned to abandon one choice and to make another. This reversal required several days for completion.

Independent Variability of Food Demands. The fact that preferential relationships can be experimentally controlled by letting an

animal feed upon the preferred food demonstrates that the demands for separate foods are, within limits, independently variable and are dependent upon the metabolic state of the animal at the time. The writer's food-preference studies have revealed independent variability of the demands for fat, carbohydrate, protein, and water. There are, of course, other specific and independently variable food demands, as Richter has shown.

Distinction between Head Receptors and Metabolic State as Determinants of Food Selection. The original preference technique (technique I), with two foods presented side by side and their positions interchanged from trial to trial, forces the rat to discriminate between the foods (if he discriminates at all) on the basis of his head receptors—especially those in the organs of taste, smell, and vision. This is because the positions of the two test-foods are constantly interchanged and the exposure time is so brief that a preferential discrimination cannot be made on any other basis than head receptors. In a newer preference technique (technique II), the two foods are widely separated and kept in fixed positions. Prior to the test, the rat is thoroughly habituated to eating the test-foods in their separated positions. With this technique the rat is forced, by the form of the apparatus, to make a choice before the foods can be seen, smelled, or tasted. Consequently, the rat's choice must rest upon his metabolic state and upon his past experience with the test-foods.

The two preference techniques, providing different bases for choice—one the head receptors, the other the metabolic state—sometimes give different results. For example, after protein (casein) deprivation up to thirty days (in an otherwise complete diet), rats, surprisingly, still prefer carbohydrate (sucrose) to protein when forced to choose on the basis of their head receptors. They do this when there has been no carbohydrate deprivation! Apparently they "like" the taste of sugar so much more than the taste of casein that they choose to eat sugar even when they must greatly need the casein. But the same animals reveal a strong and consistent *protein* preference after three to six days of casein deprivation if the head receptors are ruled out as factors in the choice by using technique II.

Again, rats that have been maintained upon a single dry powder (Purina dog chow) and distilled water, when deprived of both, prefer the dry powder to the water with remarkable uniformity when forced to make a preference on the basis of the head receptors (technique I). This preference of dry food to water persists after six days of total deprivation! On the sixth day of the experiment, however, the newer technique (II) was introduced, ruling out head receptors

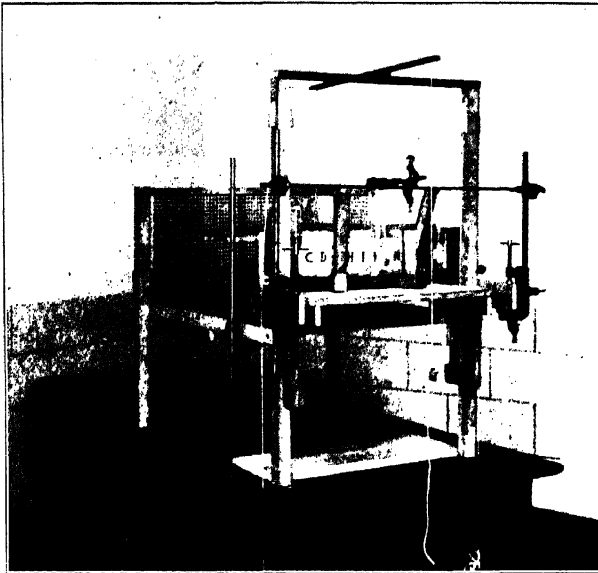


PLATE III. FRONT VIEW OF A RAT CAFETERIA AND PREFERENCE-TESTING APPARATUS USED AT THE UNIVERSITY OF ILLINOIS.

The apparatus shown in Plates III and IV provides for the continuous or interrupted exposure of the food elements used in self-selection maintenance. These elements are exposed and removed according to a prearranged plan. Preference testing is limited to pairs of foods within the total diet. For preference testing, the food containers are mounted to a shelf which can be raised and lowered.

as the decisive factor in the choice. At once every rat changed over to a consistent preference of water to food, beginning at last to satisfy their need for water which, by now, had become very acute.¹

¹ The experimental results upon which these illustrations are based have not yet been published. They were obtained in an investigation sponsored by the Committee on Scientific Research of the American Medical Association.

Apparently, when not using head receptors, the animals began making their choice on the basis of metabolic need (in this case for water) instead of depending upon taste, smell, and vision, as at first. These experiments show that the rats, when forced to make a quick choice between two constantly alternated foods, are like hungry persons in a cafeteria, confronted with attractive dishes and making

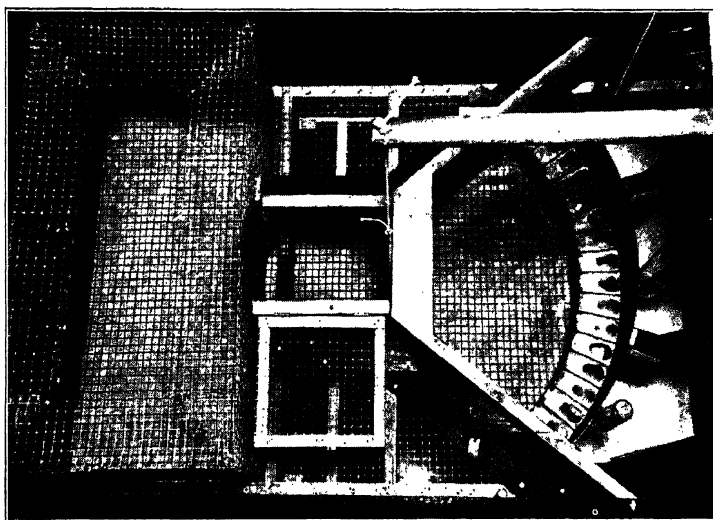


PLATE IV. TOP VIEW OF A RAT CAFETERIA AND PREFERENCE-TESTING APPARATUS USED AT THE UNIVERSITY OF ILLINOIS.

Rats are maintained, as a group, upon a diet which they themselves select from the food elements presented upon the apparatus. Under maintenance conditions the animals have access to the large living cage as well as to the fan-shaped food compartment. These two compartments are connected by a smaller, box-shaped room. For preference-testing the entrance to the large living cage is closed, and the animals are tested individually in the two other parts of the apparatus. The exit of the rat from the small room to the food compartment is controlled by a sliding door.

their hasty choice on the basis of smell, taste, or appearance, instead of nutrient value. Again, with technique II, the rats, like persons with the foresight to decide before entering the cafeteria what they shall take, choose much more nearly in accordance with their bodily needs.

In the writer's more recent experiments upon food preferences,

appetites, and dietary habits, rats are maintained in "rat cafeterias" which provide each animal an opportunity to select and balance his own diet from the food elements presented. The self-selection method of feeding the rats permits them to compensate for food eaten on the preference apparatus, in selecting their daily diet. The apparatus employed is pictured in Plates III and IV; further details are given in the description of these plates.

Appetite as a Guide. All of us know, in general, that wild animals somehow manage to locate suitable food and to select an adequately balanced diet from the *edibilia* of forest and plain. How is this possible? Is there a food-selection instinct? How far is appetite, in man and animals, a dependable guide in the selection of foods? Given a choice among a variety of foodstuffs, can an individual select a diet which is complete, balanced, and adequate to meet the biological requirements of existence?

Dr. Clara M. Davis (1928) described a self-selection feeding experiment carried out with three infants. At the time of weaning, these infants were given a choice among a variety of simple unseasoned foods—some cooked, some raw. All told, there were thirty-three kinds of food presented to the infant during the meals of a day. The foods were placed before the infant on a tray. He was allowed to eat in any way he could, using fingers, a spoon, or the more direct method. He was not corrected for table manners! With two infants the experiment lasted six months; with the third, a year.

Before each meal the foods were weighed separately, and after a meal the residue was again measured. In this way the daily intake of each kind of foodstuff was determined.

Dr. Davis reports that the infants, from time of weaning, were able to select, from a list of simple natural foods, quantities sufficient to maintain themselves with apparently optimal digestive results and in excellent health. They were happy, energetic, full of "pep," and their growth curves were slightly ahead of the norms prepared by the Children's Bureau in Washington.

The infants were omnivorous in their eating and ingested a quantity of food sufficient to give them an approximately constant number of calories from day to day. At the start, food selection was seemingly haphazard. With habituation the infants developed definite food

preferences which, however, changed from time to time and were unpredictable.

The babies tended to eat certain foods in waves or cycles. After eating cereals, eggs, meats, or fruits in small or moderate amounts for a number of days, there would follow a period of a week or more in which a particular food or a class of foods was eaten in larger and larger quantities until astonishingly large amounts were taken. After this, the quantities would decline to the previous level. Such waves were recognized in the diet kitchen and came to be known as "egg jags," "meat jags," "cereal jags," etc. These "jags" were not accompanied by symptoms of overeating, nor were the waves followed by a period of aversion for and neglect of the particular food.

A practical test of the self-selection system of feeding has been made in the orthopedic ward of the Children's Memorial Hospital of Chicago. Under the self-selection or cafeteria plan, food from the kitchen was placed in containers on a long cart, which was also used for carrying the trays. This cart made its rounds through the rooms of the ward. In a given room the nurse slowly and distinctly recited the menu for the meal. Each child was then served the items he selected in whatever quantity he wished. The youngest, who could not talk, were served some of everything, but no child was urged or obliged to eat.

Result: No appetite problems occurred. The children were enthusiastic and, when they left the hospital, regretted having to stop the self-selection feeding plan. Incidentally, there was less waste of food than in any other ward of the hospital. Each child ate what he selected himself and enjoyed the process.

More recently, Davis (1939) published the account of a similar self-selection experiment with fifteen children in which thirty-four foods (including water) were served daily. She reports that during a period of six months the diets chosen by the children were adequate as judged by nutritional standards and in terms of health, growth, and vigor of the children.

Dr. Davis' advice on feeding the infant and child does not exactly agree with the common practice of preparing a meal and requiring the child to eat it. We all know the results of forced feeding in chil-

dren and can readily sympathize with little Mary Jane's predicament, described in A. A. Milne's poem:

*What is the matter with Mary Jane?
She's crying with all her might and main,
And she won't eat her dinner—rice pudding again—
What is the matter with Mary Jane?*

*What is the matter with Mary Jane?
She's perfectly well and she hasn't a pain,
And it's lovely rice pudding for dinner again!
What is the matter with Mary Jane?*

Dr. Davis' advice in feeding the infant and child is this: Give the individual a variety of foods. Let him select the ones he will eat and reject those he does not want. Let him eat as much as he will of each element and hold to this procedure.

This work upon self-selection feeding is interesting and important, but it does not answer satisfactorily questions about the dependability of appetite as a guide. For one thing, Dr. Davis used such a wide variety of wholesome foods that the infant could scarcely go wrong. From such a diversity of foodstuffs dozens of combinations could yield an adequate diet. Moreover, for obvious reasons, toxic substances were omitted from the list.

Self-selection feeding methods, however, have been repeatedly tested in experiments with pigs, cows, chicks, rats, and mice. The net result of these researches is that, when animals are given a free choice among the components of an adequate diet (protein, carbohydrate, fat, water, vitamins, minerals), they can and do make a selection which leads to normal growth, reproduction, health, and vigor.

Moreover, animals commonly reject injurious foods. It has been claimed that range cattle recognize poisonous plants and eat only the normal or the least toxic forage. Further, if a small quantity of the toxic element (selenium) in this vegetation is placed in the food of rats, they avoid the toxic food or prefer other foods which lack the toxic element.

There is, however, another side to the argument upon the merits of self-selection feeding. Many children, and adults too, overeat

sweets or rich cream desserts and avoid vegetables and fruits which are rich in important vitamins. It has been said by a nutrition expert that most Americans are overfed. The resulting overweight condition predisposes, in middle life, to organic diseases. Then too, people ignorantly eat poisonous fishes and mussels, inedible mushrooms, castor-oil beans, and poisonous berries. Insects, rodents, and the higher mammals, including man, actually do accept the poisons which have been prepared for their destruction. Doubtless the toxic elements are tasteless or present in amounts below the taste threshold; or perhaps their taste is completely masked by other tastes and odors. In view of all this, one cannot argue that appetite is an infallible guide.

The fallibility of appetite may be further illustrated by the story of the discovery of vitamin E. When some inventive genius found a way to scour the bran coat off rice, making it pleasing to the eye and easy to masticate, this polished rice came to be preferred to the unpolished variety. To many Oriental peoples who subsist mainly on rice and fish the result was disastrous; they developed the deficiency disease known as *beriberi* (a multiple neuritis). This disease took its toll until two Dutch physiologists (Eijkman and Grijns) discovered a vital factor (vitamin B) in the bran. This vitamin had been scoured off and fed to the pigs, and the human sense of taste was inadequate to warn the Orientals that the new polished rice was deficient in a vital ingredient.

Further, laboratory experiments upon other vitamins (G, A, and D) have shown that animals cannot discriminate among foodstuffs which contain an adequate amount of these essential elements and those which lack them. In this connection it should be noted that vitamins are probably present in amounts so small that they do not affect the taste receptors. Also, the complex state of natural foods often allows one taste element to mask another, just as the full chord from a pipe organ masks a weak partial tone which could be heard if presented alone.

In view of the above facts, it is clear that the sense of taste is no more infallible a guide in the selection of foodstuffs than organic appetite is. Nevertheless, the bulk of evidence indicates that, when

laboratory animals and the human infant are offered a variety of foods from which to choose, to an amazingly high degree they can and do automatically select a diet which is balanced, adequate in calories, and one which leads to normal growth, health, and reproduction.

In conclusion, the question which the man of science must ask is this: How far, to what extent, do animals select from the available food elements a diet which is in accordance with their metabolic needs? The self-selection principle of feeding reveals that appetite is an adequate guide within limits, but to determine those limits is a problem for the laboratory rather than for speculation.

An Analysis of Appetite. The food selections of man and of animals will be examined in relation to five main groups of factors:

1. *The senses, especially taste.* It is a common observation that we accept and swallow those foods which are pleasing when presented to the tongue and nose. Foods which have an agreeable taste and smell are accepted while others are rejected. In addition to taste and smell, the other senses play a rôle in the discrimination of foodstuffs. The cutaneous and kinesthetic senses are important: If foods are extremely hot or cold, they are rejected; if they contain grit or sand, they are spit out. Perceptual qualities such as brittleness, leatheriness, and stickiness also determine an individual's response to foodstuffs. Vision and occasionally audition play secondary rôles.

Harlow (1932) tested the food preferences of blind and anosmic rats and demonstrated that the absence of vision and olfaction did not alter their food choices. Through a process of elimination he concluded that the primary sensory cues are gustatory or tactual (since the cutaneous sensitivity of the tongue and mouth was not destroyed in the animals by the operation).

A chemical response of the taste receptors to substances in contact with the tongue is the beginning of food ingestion. There is evidence that nutritive deficiencies produce physicochemical changes throughout the body (tissue hungers), including changes within the taste buds, and that these changes result in altered sensitivity of the taste buds to the needed substances. The gustatory cells are sensitized to special food substances by deprivation in much the same way that the dehydrated tissues of the throat of a thirsty animal are sensitized to water.

This principle may be illustrated by reference to some observations of Richter (1939). He determined the preferential threshold of rats for different concentrations of salt solution. He gave them a choice between distilled water and a very weak (subthreshold) solution of salt, gradually increasing the salt concentration over a period of days. With a group of twenty *normal* animals a preference for salt appeared when the concentration averaged 0.055 per cent, or about one part of salt to 2000 parts of water. With a group of eight *adrenalectomized* rats the preferential threshold averaged 0.003 per cent, or about one part of salt to 33,000 parts of water. Not only do adrenalectomized rats need more salt than normal animals to meet their metabolic requirements but also they make preferential discriminations in favor of salt solutions at much lower concentrations than do normal animals. In other words, their taste buds are sensitized to detect and respond to the needed substance; their lowered preferential threshold reflects bodily need.

Another instance of the relationship between appetite and need is found in the intense craving for sugar which is experienced by persons suffering from diabetes. Although the blood sugar of the patient is so high that sugar is given off in the urine, the tissue cells cannot utilize it because the hormone, insulin, is not being secreted in the pancreas. As a result, the tissue cells (including the taste cells) have an increased need for sugar, which accounts for the marked increase in the appetite for carbohydrates, so conspicuous in diabetes.

Thus, in some instances at least, the taste cells become sensitized to the substances needed throughout the body.

2. *Gastric factors regulating food ingestion.* General hunger is an organic state induced by food deprivation, with subjective aspects, and with various objective manifestations in behavior. The subjective feeling of hunger is partly localized in the stomach and partly generalized throughout the whole body. The gastric factor and its rôle in the regulation of food ingestion will be considered first.

According to the traditional theory of hunger motivation, food-seeking behavior is explained by persisting stimulations arising from an empty stomach. In the absence of food the stomach contracts rhythmically; in extreme hunger it goes into a spastic state. The neural stimulations from the contracting stomach furnish a bodily basis for the gnawing hunger pangs which the subject consciously experi-

ences. These painful "hunger contractions" play a part in motivating food-seeking behavior, but they constitute only one phase of the general excitement or restlessness which characterizes the hungry organism.

In a novel experiment performed by Tsang (1938) the greater part of the stomach was surgically removed from the alimentary tract of rats, the two cut ends being sutured together. In another investigation Bash (1939) isolated the stomach from the central nervous system by severing the vagi and the splanchnic nerves. In both studies it was found that after the operation the animals would still seek and ingest food; the hunger drive was little, if at all, altered by these operations. These two experiments teach that the need for food is manifest in behavior even after eliminating the factor of stomach contractions. The hunger-contraction theory, therefore, does not furnish a complete account of what it is that motivates an animal in the search for food.

The traditional theory of hunger motivation must be supplemented by a formulation which explains: (1) how the hunger drive can remain after the neural excitations from a contracting stomach have been surgically eliminated as a factor, and (2) how an animal can discriminate and select foods (within limits) according to its metabolic needs.

In considering gastric factors which are related to food ingestion, some attention should be paid to the subjectively experienced effects of eating: the comfortable satisfaction following a well-chosen meal; the more than satiated feeling after overeating; the aches, pains, and nauseas which may follow dietary indiscretions. The hungry man and his beefsteak, the plump lady and her box of chocolates, the small boy and his green apples—they need only to be recalled in this connection. There is usually little difficulty in differentiating the discomforts which follow indiscreet eating, and which tend to build up negative attitudes toward food, from the hunger pang, which precedes food ingestion and leads the individual to the activities of food seeking. All the after-effects of eating, pleasurable and otherwise, play a definite rôle in regulating food-seeking behavior.

3. *Generalized tissue hunger as a regulator of food-seeking behavior.* The subjective experience of man points toward the existence of a hunger condition throughout all the tissues of the body during food

deprivation. Children tend to localize hunger in the region of the stomach; adults do the same to a lesser extent. However, the common expressions, "I am faint with hunger," "shaking all over with hunger," "weak from hunger," "I am so hungry I ache all over," "hungry from my head to my toes," and so on, suggest that a generalized bodily state of hunger, involving all the tissues, is present during food hunger.

This tissue hunger is coexistent with and quite separate from the hunger contractions of the stomach. It is a physiochemical change, due to food deprivation, and is the condition referred to above as sensitizing the taste buds to needed substances. This tissue hunger is consciously perceived by the individual as generalized tension, hyperexcitability, weakness, or vague discomforts, sometimes accompanied by headache. It explains (at least in part) why the hunger drive remains after the neural excitations from a contracting stomach are experimentally eliminated in laboratory animals. It must play a vital part (not as yet fully understood) in enabling animals and infants to discriminate among foods and select them according to metabolic needs.

That some internal bodily factor, other than stomach contractions, regulates the intake of nutritive substances is clearly shown by some experiments of Hausmann (1932, 1933). He offered rats a choice among: (1) solid food, (2) water, (3) alcoholic solutions. Twenty animals were paired and each pair was given free access to an alcoholic solution in one of ten concentrations graduated as follows: 2, 4, 6, 8, 10, 14, 18, 24, 30, 36 per cent. In analyzing the results, Hausmann found that his animals regulated their consumption of alcoholic solution in such a way as to absorb always the same absolute amounts of alcohol, regardless of the alcoholic concentration of the solution. Further, Hausmann found that when alcohol was being consumed the intake of other foods dropped to a lower level than when alcohol was absent from the diet. Strikingly enough, the deficit in calories incurred by reduction of food intake corresponded to the amount of calories furnished by the consumption of the alcoholic solution!

In another experiment Hausmann studied the food intake of rats which were given, on different days, solutions of sugar and of saccharin. Saccharin is an interesting substance for experimental pur-

poses. Although it tastes sweet, it passes through the organism unaltered, having no nutritive or caloric value.

It turned out that rats ingested both the sugar and the saccharin solutions. As we humans would say, the rats *liked* both sweet-tasting liquids. But there was this remarkable difference in food intake: On those days when the animals ingested sugar solutions they compensated for the additional calories received from this source by lowering substantially the food intake of their maintenance diet, but on the days when saccharin was offered, the animals maintained their accustomed level of food intake. In other words, both sweet-tasting substances were ingested, but their effect upon the total intake of food was different. Hausmann writes: "The most noteworthy result is that the animals are not 'deceived' by the substitute; after a period of adjustment they always regulate their intake of food according to their real tissue needs."

In this connection one recalls the sham-drinking experiment of Bellows which demonstrated that thirst is more than a local condition of the throat and mouth and that it can be removed by introducing water directly into the alimentary tract without the usual act of drinking. Further investigation of tissue hungers should lead to a better understanding of the organic motivation for food-seeking behavior.

4. *Habits of food ingestion.* When an infant is presented with a large variety of foods, as in Dr. Davis' experiment, there is much random sampling and tasting. "They tried not only foods but chewed hopefully the clean spoons, dishes, the edge of the tray, or a piece of paper on it. Their faces showed expressions of surprise, followed by pleasure, indifference or dislike. . . ."

This food sampling was quite haphazard, but as the same wide variety of foods was presented day after day, food preferences developed. Never, writes Dr. Davis, did any infant or child eat so many foods as in the first few days and weeks of the experimental period. The preferences which developed did so without guidance from adults.

In experiments upon the food preferences of rats, the writer has observed over and over again that a preference gradually develops when a pair of foods is repeatedly presented. The general rule is that, if a rat is given a choice between two foods (one or both of them un-

familiar), there is a preliminary period of sampling and indiscriminate eating. Then, as a choice between these foods is repeatedly made by the animal, a preference develops. After a few days of testing, the rat is likely to select the preferred food on every trial for a long series of choices without even touching the less demanded food. And this occurs regardless of the relative positions in which the test-foods are presented.

The questions important to raise in this connection are such as the following: Why do certain food preferences develop rather than others? Why do infants prefer sugar to quinine? or sugar to cereal? Why do rats, when maintained on a certain standard diet, prefer milk to sugar? and sugar to wheat powder?

The facts indicate that on a given diet there is something within the organism which leads to the development of likes and dislikes for certain foodstuffs. What is the nature of this bodily mechanism?

The psychologist thinks at once of a basic law of learning: the law of effect. This law states that those activities which satisfy an individual by removing an appetite are likely to be repeated in a similar situation. When a dietary habit has been formed, it persists as a factor which regulates the ingestion of food. The factor of habit in food ingestion was clearly illustrated in an experiment reported by Harris (1933) and co-workers.

They began by feeding rats a diet from which vitamin B₁ had been removed and thus obtained animals depleted of this essential substance. Although (as Richter has shown) vitamin-depleted rats exhibit a strong drive toward vitamin B₁ when it is presented in pure form, neither rats nor men can recognize by taste alone those foods which contain only a very small, yet sufficient, quantity of the vitamin.

Harris placed a sufficient amount of the vitamin in a cocoa-flavored food and found that on the basis of taste alone the rats failed to select this food in preference to the others in their cages. But they could be "educated." They were placed for a few days in a cage with the cocoa-plus-vitamin food until they had experienced its beneficial and curative effects. Thereafter, the vitamin was removed from the cocoa-flavored food, but the rats continued to select this food for a considerable period of days even though they failed to thrive upon it.

Then they were "re-educated." They were placed in a cage for a few days and given a new food: Bovril plus vitamin. On this they

began to thrive. When given a preference test between cocoa and Bovril they continued to select the Bovril-plus-vitamin food, showing that an eating habit had been established. Thus, dietary habits are stabilizing factors in the regulation of food ingestion.

5. *Social and individual factors in appetite.* Remington (1936), a professor of nutrition, has stressed the fact that dietary habits are an outgrowth of certain mores which had their origins in the remote beginnings of tribal life. The customs and taboos which regulate the feeding behavior of savage peoples are influenced, in their development, by religion, by geographical habitat, by climate, by commerce. Among ourselves, modern inventions and advertising are factors in the establishing of dietary habits. Man has gradually become stabilized in what he eats and what he rejects. In any given locality, of course, the mores are concerned with the available food supply and are limited by it.

In a cold northern climate the Eskimos need and eat much fat, but to people who live in the tropics such extensive fat eating is disgusting. Even the Chinese express disgust at our practice of spreading butter upon bread. "Ugh! Bread with *grease* spread on it!"

The traditions of the tribe are important in determining the feeding habits of infants and children. These traditions to some extent are based upon the experiences of the group in meeting their metabolic needs and in preserving health with the available food supply.

In addition to social factors, occasionally there are individual traumatic experiences which determine personal attitudes toward certain foods. For example, the writer knows a man who will not eat butter but satisfies his need for fat in other ways. His intense dislike of butter is troublesome because of the awkward situations it creates. On a picnic, for instance, he is almost sure to be offered sandwiches containing butter, and he dislikes calling attention to his idiosyncrasy by refusing them. His dislike of butter can be traced back to a traumatic experience when he was only four years old, in which he was severely frightened by being told, in a stupid jest, that the butter he had just eaten was poison and would kill him!

Such idiosyncrasies, however, are not invariably due to traumatic experiences. There are marked individual differences in the likes and dislikes for foods as in the not uncommon story of Mr. and Mrs. Jack

Sprat. Such variations reflect differences in glandular or other functional balances within the body. They have a chemical and, perhaps, an hereditary basis.

THE DEFINITIONS OF NEED, APPETITE AND AVERSION, DRIVE, DESIRE

In the foregoing sections the terms *need*, *appetite*, and *aversion* have been repeatedly used. These terms are closely related to *drive* and *desire*. How all of them are defined and related to each other is considered below.

Need. Needs fall into at least three categories: biological, social, and personality needs.

Biological need is a conception which can be defined objectively by reference to certain criteria such as survival, growth, reproduction. The basic biological needs of an organism are simply the conditions required for survival, for maintaining a state of health, for growth, and for reproduction. To meet these needs, an organism requires a certain narrow range of temperature, plus oxygen, water, fat, protein, carbohydrate, certain minerals, and vitamins. In addition the organism needs freedom from pathogenic bacteria in the immediate environment and an optimal amount of roughage in the diet.

A practical application of the criterion of survival is found in the work of Richter (1938) and collaborators. In one of their experiments rats were maintained upon water plus one other nutritive element. This additional food element was one of six fats (olive oil, lard, wheat-germ oil, cod-liver oil, peanut oil, perilla oil), or one of five carbohydrates (dextrose, sucrose, starch levulose, lactose, galactose), or one of six proteins (casein, desiccated blood fibrin, egg albumin, lactalbumin, hemoglobin, dialyzed egg albumin). These food elements were then arranged in an order of their beneficial effects in sustaining life. Among the fats, life was sustained the longest upon olive oil; among the carbohydrates, dextrose gave the longest survival; of the proteins, casein was found to give the longest life. Thus, with the need for water fully met, the relative survival time of rats maintained upon various single dietary elements was discovered. Incidentally, the purpose of this work was to determine which representative of the essential kinds of food could best be employed in self-selection feeding experiments. This experiment is cited to show that bodily needs can

be analyzed in terms of survival time. With survival as a criterion the tissue needs of an organism can be determined objectively.

In addition to these biological needs there are social ones—the need to maintain status within one's group, the need to win preëminence, the need to save one's face, the need to avenge an affront, and so on. These needs differ from group to group, and the way in which they are met depends upon the culture. For example, among the Kwakiutl Indians of our Pacific Northwest Coast a wrong is avenged by a potlatch. If two men have a quarrel, one of them may give a potlatch or feast, at which the aim is to give away or destroy by fire as large an amount as possible of his own property. A man in this way may humble his rival, if the rival is unable to have an equally conspicuous potlatch. The display and destruction of property is used to establish and maintain social status, to avenge a wrong, to wipe out an insult.

Closely related to social needs are personality needs—the need for a sense of security, the need to gain self-confidence through success, the need for esthetic expression, the need, broadly speaking, for integration of the whole personality.

Appetite and Aversion. The concept of appetite is more strictly psychological than that of need. Appetites are persistent physicochemical states of the organism which lead to a rise or a fall in the level of activity. The changed activity persists until a particular consummatory or goal response is made. The goal response restores homeostasis or internal equilibrium.

Appetites are cyclic. Starting with complete satiation, appetite begins at zero, gradually develops, and strengthens to a maximum. At this point, then, there is usually a restlessness and the learning of some behavioral road to the goal or consummatory response. This response removes the appetite by meeting the tissue need and restoring homeostasis. After satisfaction, the organism is indifferent to the goal object. There may be an oversatiation and a corresponding period of negativity (aversion) in behavior, shown by avoidance of the goal object. From this point the appetite builds up again and continues the cycle.

Appetites are probably experienced in the newborn infant as vague restlessness or desire for quiescence. In the adult, appetites are subjectively felt as specific urges toward water, food, elimination, mate, rest, sleep, and so on. The satisfaction of an appetite brings a conscious relief or pleasing relaxation along with the disappearance of the purposive urge.

The term *aversion* implies a negative relationship between the organism and the object against which the aversion is directed. This negative relationship may rest upon a physiological state, as with the fat aversion of an individual who has been more than satiated upon a diet of fat. An aversion may be culturally determined as, for example, with the taboo against eating pork. Sometimes an aversion rests upon a traumatic experience, as in the above-mentioned instance of a man who would not eat butter after being told, as a child, that the butter he had eaten would poison him.

Normally, aversive behavior continues until an organism has removed the source of pain, injury, distress, or until he has escaped from it. Appetitive behavior, contrastingly, continues until a goal object has been attained or until a goal response, which restores internal equilibrium, has been made.

The terms *appetite* and *aversion* are sometimes loosely used to designate latent attitudes, which are not manifest in behavior. For example, when we say that John Smith has an aversion to cold winter weather, to Limburger cheese, to the tone of a saxophone, we do not mean that he is responding actively against or away from the weather, the cheese, or the saxophone but merely that he possesses a latent organization against these things.

The Term *Drive*. The term *drive* has so many meanings in contemporary psychology that its use sometimes makes for confusion rather than for clarity of thought. As used today, it has at least these five meanings: (1) a persisting stimulus which liberates energy and arouses bodily movement, *e.g.*, the stimulus from a contracting empty stomach or from the painful pressure of a heavy rock on the foot; (2) a physicochemical state which changes the excitability of nerve cells, *e.g.*, a state of fatigue; (3) purposive behavior, *e.g.*, the persistent activity of a man digging his way out of a snowed-in cabin; (4) a change in the level of general activity, *e.g.*, periodical changes in "drive" associated with the estrous cycle; (5) a determination to act, a set of the individual toward a specific goal.

A further source of confusion lies in the fact that the term is sometimes used descriptively and sometimes in an explanatory sense. For instance, when *drive* is defined as persistent purposive behavior, the term is used as a descriptive label rather than to designate an explanatory principle. Again, the term *drive* is sometimes used in a physiological sense to explain observed behavior; *e.g.*, the term *hunger drive*

is used to explain food-seeking behavior. Either of these two usages is satisfactory if one remembers when it is used descriptively and when in an explanatory sense.

Explanation, in science, consists of the addition of new factors relevant to the facts for which an explanation is sought. This addition may be found in present or in past conditions. In hypothetical explanation the addition is some imagined factor or condition. One does not need a doctrine of drive in order to explain psychological facts.

The above definitions of drive are interrelated and overlap somewhat. The most useful definition of drive is probably a physiological one, combining numbers 1 and 2 above, which interprets the bodily state as a motivational source or explanation of behavior. In this sense appetites and aversions, as defined above, are drives.

Desire. A desire is a conscious experience. It is the subjective aspect of a motive and is always goal oriented. In so far as desires rest upon the physicochemical state of the organism, they are the conscious aspect of appetites; but the concept of desire is broader than this. The anticipated goal of a desire may refer to any object or activity under the sun. Desires range in degree from those that are felt very mildly to the most intense cravings.

Desires may be directed toward general goals such as the achievement of happiness, success, power; or toward specific objectives such as to marry a particular girl, to own the largest house in town, to be elected mayor of the city. A person may desire anything from a beef-steak to a place in heaven.

With animals, desire is sometimes assumed to exist, even though we can know nothing directly about their consciousness. A chimpanzee, to illustrate, had been made a drug addict for experimental purposes. He revealed a powerful drive toward the room where morphine was administered. He vigorously tugged at the experimenter's hand, pulling him toward the laboratory where injections had been made. After a period of drug deprivation, he definitely preferred the hypodermic needle to food. Although the chimpanzee could not talk, his behavior clearly indicated that he experienced an intense craving for an injection of morphine. If we refer to the chimpanzee's *desire*, however, we are making a subjective interpretation rather than an exact explanation of behavior.

Dorcus and Shaffer (1937), following the formulation of Dunlap, have pointed out that there are basic desires which rest upon intra-

organic conditions. The primary desires are of several kinds: alimentary, excretory, amorous, reproductive, parental, the desires for pre-eminence and conformity, for activity and for rest. Each of these desires contains an element of anticipation. For each desire the individual is oriented toward a situation which permits the particular consummatory response for that desire.

Desires should be distinguished from *needs*. An individual, for example, may need a particular vitamin and be wholly unaware of the fact. He may not desire it. Again, there is evidence that need and desire do not always vary directly in a one-to-one relationship with each other. To illustrate: In a prolonged fast the need for food increases continuously up to the point of death by starvation. The *desire* for food, however, is very intense for a few days and then is replaced by a sense of weakness and inactivity. In this example, the objectively defined need for food and the individual's desire do not run parallel courses. Under many circumstances, however, desire does correspond to need.

CONCLUSION

Human and animal behavior is directed toward the meeting of basic needs. Many of these basic needs are biological; others are social and personality needs.

In order to survive, an organism must maintain a relatively constant internal physicochemical state (homeostasis). The requirements of biological existence can be described objectively; from a knowledge of these requirements one can define precisely what an organism *must have* in order to survive. But survival is only one of the possible criteria of *need*. There are others, such as reproduction, growth, and resistance to pathogenic bacteria.

To meet these criteria, the organism *needs* air, water, protein, carbohydrate, fat, certain minerals, and vitamins, and *needs* to maintain itself within a certain narrow range of temperature.

A *need* is not a motivating factor. The word simply designates an objective maintenance relationship between the organism and its environment, which can be treated quantitatively. *Appetites*, in contrast, are typically motivating states of the organism. The appetites for air, foodstuffs, water, mate, sleep, rest, and elimination are physicochemical states of the organism. These bodily states liberate energy and excite the nervous system, thus initiating behavior. In this way an

appetite is an intraorganic source of restless activity or of quiescence.

Internal appetitive states become externalized in the sense that the individual learns how to act, where to turn in order to meet his needs and satisfy his desires (*i.e.*, remove his appetites), thus restoring internal homeostasis. In the developed organism the restless activity is turned into persistent goal-directed behavior.

When goal-directed behavior has been developed, there arises the possibility of frustration and conflict, as well as the possibility of satisfaction. In other words, the externalized appetite (goal-directed behavior) presents the possibility of disturbance arising from environmental sources. The frustration and satisfaction of the basic appetitive drives are a major source of feeling and emotion.

In spite of this close relationship between appetite and emotion, appetitive states are psychological entities quite distinct from emotion. Subjectively considered, the two are very different. We commonly speak of *feelings* of hunger, thirst, fatigue, and so on, but do not call these feelings *emotions*. From the physiological point of view, internal bodily changes are present in both appetite and emotion, but they are not alike. In emotion there are changes in glands and smooth muscle, involving the functioning of viscera, while in each appetitive state the organs chiefly affected are those directly concerned with satisfying that particular appetite (in hunger, the stomach; in sex appetite, the generative organs; and so on).

In behavior, a striking contrast appears between the disorganization characteristically present in emotion and the goal-oriented behavior in appetitive states. One other important point of difference between emotion and appetite is their source. Emotions are disturbed states which begin in the psychological situation and not in the intraorganic condition as do appetites.

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CHAPTER IV

EMOTIONAL DEVELOPMENT

Before turning to the study of emotional development it will be worth while to consider briefly what is known about the genesis of behavior in the embryo. Systematic observations of the behavior of the *human* embryo have not been made. The first responses of the human fetus to stimulation can be observed only on relatively rare occasions of surgical operation. But with animals the life of mother and embryo can be sacrificed in order to observe the beginnings of behavior. There is dependable information upon the behavior of non-human embryos. What are the characteristics of the earliest responses of the embryo?

The following account of the beginnings of behavior in the embryo serves at least as a background for consideration of this question.

First Behavior of the Embryo. During the first months of uterine existence, the behavior of the animal fetus can be described as a diffuse and aimless "mass activity." Movements involve gross portions of the body. As the fetus grows, however, patterns of specific activity, similar to those employed in walking, swimming, and feeding emerge out of this diffuse mass action. After birth a process of differentiation proceeds, the patterns of response becoming increasingly specific, definite, precise, until finally they can be recognized as the forms of adaptive behavior which characterize the mature organism.¹

In a remarkable account of behavioral development in the embryo salamander, *Amblystoma*, Coghill (1929), in discussing the relation between behavior and bodily structure, shows how specific patterns of activity develop out of more general patterns. At a given stage of development, he states, the general patterns of behavior dominate the then-existing specific patterns. To illustrate the point two examples of the developing behavior of the salamander will be cited.

1. In the development of *walking*, the first movement of the leg is part of a postural reaction of the trunk. Before the limb can respond

¹ On this view see Irwin (1932).

separately to the stimulations from the outside, it responds to internal stimuli arising from a particular posture of the body. The movements of each limb are coördinated with gross movements of the trunk in such a way that as one flexure after another passes from the head of the animal tailward, the limbs adjust themselves to the dominant position of the trunk. Even at later stages of development—when each leg has acquired a certain degree of functional independence and can respond to external stimuli—the posture of the trunk still retains its dominant rôle in regulating locomotion.

Thus, as Coghill has shown, trunk movements develop prior to independent limb movements; and the latter are dominated by trunk movements even after they have acquired a certain amount of functional independence.

2. Similarly, in the early development stages of the *feeding reaction*, the trunk component—a short quick jump forward—becomes functional before the snapping with the mouth appears. This characteristic forward jump can be evoked by a light touch upon a limb or adjacent parts before there is any evidence of a visual response. Somewhat later the jumping response appears when a bristle or similar object is moved back and forth at a distance of two or three millimeters in front of the young salamander's eyes. Under this stimulation the animal jumps forward toward the moving object, but without making any perceptible jaw movement. Still later, the performance includes actual snapping at an object which is moving in the field of vision.

Here, then, gross trunk movements develop first, the earlier ones in response to external contact, the later ones in response to movement within the visual field. Finally there ripens a mature, integrated behavioral pattern for catching a moving object in the mouth.

The process by which a specific response is differentiated out of mass activity is known as *individuation*. By this process the emerging behavior pattern develops within and out of general integrated patterns. Behavior is integrated at every embryonic stage. The term *individuation* describes one of the two main aspects of the development of behavior. The other aspect of that development is *integration*—the process through which preformed patterns are organized to form a larger integrated whole.

There are, in fact, two main theories as to the nature of behavioral development. One holds that maturation proceeds by individuation; the other, that it is accomplished through a process of integration. The formulation of both of these theories is premature. Much more observation and analysis will be required before a complete and final genetic theory of behavior can be formulated.

Working toward this end, Carmichael (1934) observed the responses of fetal guinea pigs when a hundred specific areas of the skin were stimulated. He found that each of these receptor zones, when stimulated, elicited, from the first appearance of any response, a characteristic and individual reaction pattern. These patterns of response varied from one test to another according to the stage of development of the fetus, but at any given time each pattern could be described in terms of stimulus and response.

From his observations Carmichael worked out a developmental schedule of the behavior of the fetal guinea pig. A few examples, chosen at random from his list of a hundred, are presented below for illustrative purposes. In each instance there is given the receptor area stimulated, the age of the fetus at the time of the first appearance of the response, and the locus or general nature of the response.

RECEPTOR AREA STIMULATED	AGE OF FETUS AT FIRST RESPONSE	LOCUS OR NATURE OF FIRST RESPONSE
Angle of lip	32 days	Neck and forelimb
Brow	40 days	Wink of unopened eye and pinna reflex
Hip	32 days	Trunk, forelimbs and hindlimbs
Elbow	34 days	Forelimb and digits
Tongue	36 days	Tongue movements

Among various points brought out by Carmichael's work the more significant for the study of behavioral development are these: There are definite stages in the behavioral development of the embryo. At each stage specific patterns of response (varying with age) appear when given receptor areas are stimulated. Movements involving larger groups of muscles are the first to appear; these are followed by more specific movements.

Another principle of behavioral development having psychological interest is the following. In the early stages behavior is controlled by *internal* bodily states and stimulations; later *external* stimulations become effective in the control of behavior. For example, Coghill

(1936) has shown that, in the embryo toadfish, rhythmic integrated muscular contractions are observed before sensory structures become functional. These movements are endogenous in origin; they are accelerated by an increase in the quantity of carbon dioxide present in the solution.¹ The observation is important because it establishes the fact that chemical motivation is prior, genetically, to neural.

In a sense, as Coghill has shown, the development of the nervous system anticipates future forms of behavior. That is to say, at each given stage of development more neural structures are present within the organism than are required for the immediate behavior. This overgrowth is especially marked in the neural mechanisms required for learning. In general, the higher the animal ranks in an order of intelligence and the greater its capacity for psychological development, the more extensively do the central neural mechanisms develop prior to the motor mechanisms.

With this brief survey of the genesis of behavior in the embryo, as a background, we go on to the study of emotional development in the infant. At what stage of infant development does emotional behavior first appear? How can the earliest emotional responses be distinguished from non-emotional activities?

UNDIFFERENTIATED EMOTIONAL EXCITEMENT

The first sign of definitely emotional behavior in the human infant is a general excitement due to intense stimulation. Perhaps one should speak of this simply as *excitement* rather than as *emotional* excitement.

The diffuse excitement of the infant is analogous to the undifferentiated emotional excitement which appears in human adult behavior.

Stratton's View. In arguing that excitement plays a basic rôle in human adult behavior, Stratton (1928) has pointed out that excitement may be the precursor or the successor of any other emotion. General excitement, he says, may turn into fear, anger, sexual emotion, or some other specific emotional state. These, again, may leave an aftermath of general excitement.

Excitement may also stand alone—when the stimulation of the

¹ Since the sensory structures are not yet functioning, the effect of the carbon dioxide must come from within.

organism is excessive or unfamiliar or when the outcome of an impending event is not known. At a football game, for example, before the players have come onto the field, excited behavior can be seen among the spectators. The sight of the vast, colorful throng, the cheering and singing, the anticipation of the game combined with sentiments of loyalty to one's team, antagonism toward the opposing side, and the uncertainty of the outcome—all these things tend to excite the onlookers.

We might add that not only external stimulations but also internal organic changes can produce a state of excitement. When adrenin has been injected into the blood, the subjects report an experience of being keyed up, on edge, generally excited.

In Fig. 6, Stratton has pictured excitement as the basic, undifferentiated form of human emotion. The diagram presents more highly

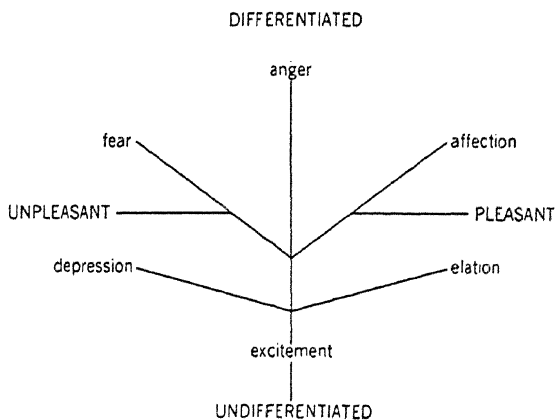


FIG. 6. EXCITEMENT AS A BASIC, UNDIFFERENTIATED EMOTION. (After Stratton.)

differentiated emotions at the top and the less differentiated ones at the bottom. Emotional states which are subjectively *pleasant* are shown at the right and those which are *unpleasant* at the left. The lines indicate that excitement may become any one of the other emotions and vice versa.

Although Stratton did not stress the genetic priority of emotional excitement, it is psychologically correct to add a genetic emphasis to his doctrine. In the infant the first emotion to be observed is diffuse excitement.

During deep sleep the infant is imperturbable; sounds, lights, contacts, and motions which excite him during waking hours leave him literally unmoved. When awake, he responds more readily to sensory stimulations; at moderate intensities of stimulation the infant is active but definitely non-emotional. When the stimulations are intense or repeated or persistent, the infant responds with an increased excitement (diffuse general movements). With still more intense or repeated stimulations he cries, then screams and struggles. When general excitement is accompanied by crying or screaming, all would agree that it is definitely *emotional* excitement.

The following sections will bring out in more detail this important fact: The early emotional behavior of an infant is a diffuse, undifferentiated excitement, and the more specific forms of emotional behavior develop out of this undifferentiated activity.

Diffuseness and Lack of Specificity in Early Behavior. One of the traditional views within psychology is that the newborn infant is a bundle of reflexes. Blanton (1917) illustrated this in summarizing observations of the neonate. She wrote:

During the first twenty minutes of life may be observed sneezing, yawning, tears, sucking at nipple, fixation on light, putting thumb in mouth, jumping to loud sounds, grasping, crying with box-shaped mouth, crying with the corners of the mouth pulled down, following a moving hand with the eyes, turning of the head in such a way as to get air when placed on the face, turning over when given a very slight advantage, complete erection of penis, and most indicative, perhaps, the cry of so-called anger immediately after birth, justifying perhaps Kant's oft denied statement that the cry of a child just born has not the tone of lamentation but of aroused wrath. [482]

More recent observations, however, have revealed the diffuseness and generality of infant behavior rather than its specificity. Pratt, Nelson, and Sun (1930), for example, have shown that the sensorimotor responses of the infant are not nearly so specific at birth as had formerly been supposed. Any one of several reactions may occur in the human infant after a given stimulation. Further, the same reaction may be evoked by a wide variety of stimulations. To illustrate the last point: These experimenters noted that stimulating the lips of the newborn infant was followed by sucking movements in over 90 per cent of the infants tested; but sucking was also produced by stimulating

the cheeks, the eyes, the temperature sense, and the senses of taste and smell. Thus, although sucking is a specific response to stimulation of the lips, it is also elicited by many other kinds of stimulation. In fact, almost any mild stimulation may release the sucking response in the infant.

These investigators state that, while the infant is equipped with a variety of reflexes, the degree of their specificity has been much exaggerated. Moreover, many of the reflexes and emotional patterns which other investigators have described were not observed by them. For example, the newborn infant does not withdraw his hand precisely from a painful stimulation, but he is merely excited thereby; nor does he exhibit any of the much discussed emotional patterns of fear, rage, and love.

In short, behavior of the infant is not at all precise and specific; it consists largely of mass action—general or diffuse activity. This activity is greatest in those bodily segments near to the region stimulated and decreases in magnitude and frequency in rough proportion to the distance from the zone stimulated. This decreased frequency and intensity of response in the adjoining segments does not imply, of course, that activity within any given segment is well coordinated.

Specificity of behavior develops with growth and especially in response to the infant's social environment.

Essentially this same view has been expressed by M. and I. C. Sherman (1929). They observed that the first overt bodily reactions of newborn infants are simple sensorimotor responses—strikingly undefined, uncoordinated, and aimless. Out of such vague, undifferentiated behavior there develop the characteristic adaptive processes of later life.

Some reflexes, it is true, are present in workable fashion shortly after birth. Examples are swallowing, closing the eyes upon stimulation of the cornea, and grasping a small stick placed in the hand. Sucking is present in nearly all infants after twenty-four hours; sometimes before this age sucking is difficult to elicit. Sneezing, the knee jerk, and the biceps and triceps reflexes, also, can be demonstrated in the newborn. The Babinski reflex is elicited by a light pressure on the sole of the foot.¹ Stimulation of the larynx or pharynx induces an

¹ During the first few weeks the Babinski reflex is supplanted by the plantar reflex and does not again appear in adult life. If one stimulates lightly the sole of an infant's foot, the toes stretch upward and outward. This is the Babinski reflex. Later in life the same stimulation causes the toes to move downward and press together. This is the plantar reflex.

or excitement produced by a large variety of stimulating conditions. This diffuse or general excitement, Bridges believes, is one of the innate emotions, perhaps the only one. During excitement in the young infant the arm and hand muscles are tensed; the breath is quickened; the legs make jerky kicking movements; the eyes are opened as if gazing into the distance, and the upper lid is arched.

The stimulations which produce such agitation or excitement are: direct sunlight in the infant's eyes, suddenly picking up the infant and putting him down on the bed, pulling the infant's arm through his dress sleeve, holding the arms tight to the sides, rapping the baby's knuckles, pressing the nipple of a bottle into the mouth, the noisy clatter of a tin basin thrown onto a metal table or radiator, and so on.

Bridges (1932) writes:

Time after time on waking suddenly from sleep the infants were observed to wave their arms jerkily, kick, open and close their eyes, flush slightly, and breathe quickly and irregularly. Some grunted, some cried spasmodically for a moment or two, while others cried loudly for several minutes. The combined stimulation of light, of sounds, of damp or restricted bed clothes, and the change from sleeping to waking breathing-rate seemed to produce a temporary agitation and often distress. Waking apparently requires emotional adjustment.

The hungry child before feeding would often show restless activity, waving, squirming, mouthing and crying at intervals. The infant who had been lying in one position for a long time and the tired child before falling asleep would also show emotional agitation. Their breath would come jerkily, uttering staccato cries of "cu-cu-cu-ah," and they would thrust out their arms and legs in irregular movements. At the moment the nipple was put into the hungry baby's mouth he again breathed quickly, occasionally cried, waved the free arm, and kicked in excited agitation. [325 f.]

Whether *distress* is an innate form of emotional excitement or whether it becomes differentiated from simple excitement at a very early age is a moot question.¹ It is difficult, Bridges states, to distinguish distress from general agitation in the newborn; but in a three-weeks-old infant *excitement* and *distress* are already distinguishable.

Dr. Bridges continues:

The cry of distress, recognizable in the *month-old* baby, is irregular. There are short intakes of breath and long cries on expiration. The eyes are 'screwed

¹ If we accept *crying* as a criterion of distress, there is no problem here, for the existence of a birth cry demonstrates that "distress" is possible at birth.

up' tight, the face flushed, the fists often clenched, the arms tense, and legs still or kicking spasmodically. The mouth is open and square in shape or, more usually kidney-shaped with the corners pulled down. The pitch of the cry is high and somewhat discordant, and sounds something like "ah, cu-ah, cu-ah, cu-ah."

Cries of distress were heard from month-old babies in the hospital on the following occasions; on waking suddenly from sleep, struggling to breathe through nostrils blocked with mucus, when the ears were discharging, when lying awake before feeding time, after staying long in the same position, lying on a wet diaper, when the child's buttocks were chafed, and when the fingers were rapped. The three main causes of distress at this age, therefore, seemed to be discomfort, pain, and hunger. [327 f.]

Delight, also, according to Bridges, is recognizable at an early age. The main characteristics of delight are these: open eyes and expansion of the face into a smile as contrasted with the puckering of the forehead and closing of the eyes in distress; movements of incipient approach rather than withdrawal; audible inspirations and quickened breathing; soft vocalizations lower pitched than those of distress or excitement; more or less rhythmic arm and leg movements which are free from restraint; prolonged attention to the object of interest; cessation of crying.

Although these details of behavior vary from child to child and at successive ages, delight can always be recognized by certain characteristic activities. Free and rhythmic movements, welcoming and approaching gestures, and smiles and vocalizations of middle pitch are the commonest features.

At *eight months* of age the child seems to take more delight than ever in self-initiated purposeful activity. He babbles and splutters and laughs to himself. Especially does he seem delighted with the noise he makes by banging spoons or other playthings on the table. Throwing things out of his crib is another favorite pastime. He waves, pats, and coos, drawing in long breaths, when familiar adults swing him or talk to him. He will watch the person who nurses him attentively, exploring her, patting gently, often smiling. Here are perhaps the earliest demonstrations of affection. The child will also pat and smile at his own mirror image. But his behavior is rather more aggressive and inquisitive than really affectionate. [335]

An examination of Fig. 7 reveals that the original emotions persist as the infant develops and that more specific emotions become differentiated out of the earlier patterns. The two-year-old, for example, still exhibits general excitement, distress and delight; but in addition

to these basic emotions he has by this age acquired several more specific emotional responses, which Bridges designates as fear, disgust, anger, jealousy, joy, elation, affection for adults, and affection for children.

Bridges discusses in detail and with many illustrations the growth of specific forms of emotional behavior out of the original diffuse excitement. But the details will be omitted here because the problem of the development of specific emotions will be considered in other sections of this chapter. In the present context we will merely summarize the principles of emotional development as they have been described by Bridges.

First, the different specific emotions are seen to emerge gradually, with growth, out of diffuse, undifferentiated emotional excitement or agitation. Very early (perhaps at birth or soon thereafter) distress can be distinguished from excitement; slightly later the smile of delight can be recognized.

Second, the form of response for each specific emotion depends upon the habits and skills which have been acquired by the individual. For example, anger in the year-old child differs from anger in a five-year-old who can strike with clenched fist, and the latter's anger differs from the anger in a ten-year-old who can command a sizable vocabulary.

Third, there is a change at each succeeding age level in the kind of situation which arouses an emotional response. To illustrate: A rabbit may induce fear in a two-year-old but not in an older child. The adult, in contrast, is afraid of water's trickling through a dam; to him this signifies an impending disaster, but the two-year-old shows no fear in the situation, possibly not even interested attention.

The Distinction between Delight and Distress. Bridges' genetic theory of emotion implies that there are adequate criteria for distinguishing among delight, distress, and indifferent emotional excitement. What are the grounds of these distinctions?

In the psychology of everyday life the distinction between delight and distress is made on the basis of subjective experience. Delight is a *pleasant* emotional experience, and distress an *unpleasant* one. Excitement may be pleasant, unpleasant, or neutral.

Subjective experiences, however, are not the basis for the distinc-

tion between delight and distress in infants. The infant cannot introspect and report to us how and what he feels. There are objectively observable cues. The mother of an infant unhesitatingly regards the smile and laugh as signs of delight, and the frown and cry as marks of distress. Such patterns of response as smiling, laughing, frowning, and crying can be objectively observed quite apart from any question of the subjective feelings of the infant.

These responses can be utilized by the objective psychologist as criteria of delight and distress. It is here proposed that the smile and the laugh be accepted as objective marks of primitive delight. The smile usually indicates a relatively weak affective process, and the laugh an emotional upset. With the infant and young child, smiling and laughing tend to occur under specific conditions such as these: (1) when an appetite—hunger or thirst—is satisfied; (2) when there is relief from various discomforts, such as those produced by a damp diaper, a pin pricking the skin, internal colic pains, or other aches; (3) certain positive stimulations—colored objects, rattles, warm contacts, sweet tastes—and especially *social* stimulations from parents or other adults; (4) when the free movements of play and rhythmical dancing are made.

It is here proposed that the frown and the cry and especially the scream be recognized as the objective criteria of primitive distress. The frown frequently anticipates overt crying. Sometimes, however, frowning exists alone without developing into a cry. When the crying becomes intense, it turns into a scream. With the infant and young child, frowning, crying, and screaming tend to occur under a variety of circumstances such as these: (1) when there is an organic state of hunger or thirst; (2) when there are painful external stimulations such as pins pricking the skin and a wet diaper; (3) when there are certain positive presentations—dazzling lights, loud sounds, bitter tastes, etc.; (4) when the individual is frustrated by other persons, as when an older child takes away a toy.

Indifferent excitement is marked by an increased level of general activity. There are random, excessive movements of the musculature. In its pure form emotional excitement is free from the objective signs of delight and distress, but excitement frequently turns into delight or distress.

CONDITIONING AND RECONDITIONING OF EMOTIONAL PATTERNS ILLUSTRATED BY FEAR

The phrase "conditioned emotional reaction" can be traced back to the observations of Watson and Rayner (1920). A well-known example of a conditioned emotional reaction is the fear response of Albert, aged nine months, to a white rat.

Albert at first showed no signs of fear when presented with a rat, rabbit, dog, monkey, masks with and without hair, cotton wool, a burning newspaper, and other objects. But when a loud noise was made by striking a steel bar, he behaved emotionally. Response: The infant started violently; his breathing was temporarily stopped and his arms were raised in a characteristic manner. On the second stimulation the same thing occurred and, in addition, Albert's lips began to pucker and tremble. On the third stimulation the child broke into a sudden crying fit.

At the age of eleven months and three days, the conditioning experiment was tried. A white rat was presented; as before there was no fear. The next time the rat was shown, a loud sound was produced by striking upon the steel bar. There was a definite fear response to the loud sound.

On the following days when the rat alone was presented Albert began to cry. At the first test he not only cried but also almost instantly turned sharply to the left, fell over on the left side, raised himself on all fours, and began to crawl away so rapidly that he was caught with difficulty before reaching the edge of the table. The fear response had become conditioned to a stimulus-object not originally producing it.

The response was generalized. It was found that Albert now showed fear when presented with a rabbit and with various other furry animals and objects made of or resembling fur.

Other forms of conditioned emotional reaction have been reported. Thus, H. E. Jones (1930, 1931) described the conditioning of a fifteen-month boy to a bell. The infant was given a weak electric shock which produced startle. When a bell was sounded, there was no startle. Then this bell and a shock were presented simultaneously; this was done repeatedly. At a final test it was found that the bell, when sounded alone, brought the startle pattern.

The Elimination of Fears in Children. Proceeding upon the basis of Watson's hypothesis of emotional conditioning, M. C. Jones

(1924a) investigated the means of eliminating the fears of children. In her study an attempt was made to remove the fear of animals, which was shown by a boy, Peter, at the age of thirty-four months.

The boy came from a highly unsatisfactory home environment. When tested in the laboratory Peter was found to be afraid of a white rat, a rabbit, a fur coat, a feather, cotton wool, and similar objects; but he was not afraid of blocks and other toys which were free from fur. At the sight of a white rat (which had been placed in the crib from behind a screen) Peter screamed and fell flat upon his back. He was in a paroxysm of fear. It was decided to see whether such fear could be removed and whether the reconditioning would spread in such a way that the fear of other objects could also be removed.

Each day Peter and three other children (selected because they were fearless toward the rabbit) were brought into the laboratory to play. The rabbit was always present during part of the play period, and from time to time Peter was brought in *alone* to observe his progress in overcoming the fear.

There were more or less regular gains in emotional tolerance of the rabbit from an initial terror at the sight of the animal to a completely positive attitude with no signs of disturbance. To rate these changes in fear attitude, a scale of toleration was devised. The scale contained seventeen steps between the two extremes here reproduced:

(1) Rabbit anywhere in the room causes fear reactions.

(17) Lets the rabbit nibble his fingers.

During the first period of observation there was a distinct gain in emotional tolerance. Then Peter was ill with scarlet fever and spent two months in the hospital. On the way home from the hospital he happened to become terrified by a dog.

As Peter and the nurse entered a taxi at the door of the hospital, a large dog, running past, jumped at them. Peter and his nurse were both frightened, Peter so much so that in the taxi he lay pale and quiet while the nurse debated whether or not to return him to the hospital. Being threatened by a large dog when ill and in a strange place, and being also in the company of an adult who showed fear, was a most terrifying situation against which all the previous training had not fortified him.

After this illness and fright Peter was again tested in the laboratory. He was terrified at the sight of a rabbit.

It was then decided to try the method of direct conditioning. Peter was seated in a high chair and given food which he liked. The experimenter brought the rabbit in a wire cage as close as possible to him without arousing any response which might interfere with eating. Occasionally other children were brought into the room to facilitate the process of re-education. In this way the fear was gradually eliminated and positive responses to the rabbit were established. At one point in the experiment, however, Peter received a slight scratch from the rabbit which temporarily retarded the extinction of the reaction.

After prolonged training Peter became tolerant not only of the rabbit but also of other furry objects. There was no fear, for example, of cotton or of a fur coat or of feathers. Peter looked at them, handled them, and turned without fear to something else. He picked up a tin box containing frogs or rats and carried it around the room. He picked up a fur rug. He became positive to angleworms, mice, and other living things. In a word, systematic reconditioning completely eliminated many useless fears.

In another study, M. C. Jones (1924*b*) examined the relative merits of seven common methods employed to remove the fears of children. These methods are listed below:

Elimination through disuse.

The method of verbal appeal.

The method of negative adaptation (familiarity brings indifference).

The method of repression.

The method of distraction.

Direct reconditioning (presenting the fear-object with one which is desired).

Social imitation (playing with children who lack the fear).

Dr. Jones found that the last two—the methods of direct reconditioning and social imitation—were the most effective ones in eliminating the fears of children.

Throughout all this work upon the elimination of children's fears there is a normative point of view. It is tacitly assumed that certain fears are undesirable and that the child makes "progress" in

eliminating them. The normative view is practically important and valuable in itself, but it should be remembered that scientific description is factual and that the processes of conditioning can be studied without evaluation regarding the goodness or badness of emotional behavior.

The conception of conditioned emotional responses has played so important a rôle in current discussions of emotional development that the psychological theory of conditioned emotional patterns must be examined critically.

Critique of Watson's Hypothesis of Conditioned Fear Responses. Every student of present-day psychology is familiar with Watson's (1929) account of the three primary emotional patterns—rage, fear, love—and the way in which they can be conditioned. The process of conditioning is illustrated by the acquisition of fear responses, described above with the infant, Albert.

According to Watson, fear is a complex pattern of response, including a quick catching of the breath, a clutching at random with the hands, a sudden closing of the eyelids, puckering of the lips, and then crying. In older children there is sometimes flight or hiding (but it is uncertain that this element of flight is innate).

This innate fear response is elicited by two main kinds of stimulation. (1) *Mechanical disturbance*: Sudden removal of support, as when the infant is dropped from the hands and caught by an assistant, arouses fear. Again, when the infant is just falling asleep or ready to waken, a sudden push or slight shake or a quick jerk of the blanket upon which he is lying will occasionally produce the fear response. (2) *Loud sounds*: Striking a metal bar, or other intense and sudden sound, arouses fear.

The fear pattern, Watson states, can be conditioned to stimulations which did not originally produce it. To illustrate, the infant at birth has no fear of darkness. He may become afraid of the darkness, however, if a clap of thunder or other loud noise occurs while he happens to be in the dark.

The Watsonian doctrine of conditioned fear responses can be criticized on the following counts.

In the first place, Watson's theory that there are innate emotional response patterns, which can be attached through conditioning and removed through reconditioning, presupposes a particular view of

emotion—the view that an emotion is a pattern of response. The arguments which are valid against the pattern-response theory of emotion (pages 37–42) are all valid arguments against Watson's theory.

As a matter of fact, the observations of Bridges, of Sherman, and of Pratt, Nelson, and Sun agree that emotional development does not commence from a group of preformed emotional patterns of response but rather from diffuse excitement. It is not an accurate statement to say that at birth the infant reveals three emotional response patterns (rage, fear, love) and that emotional development consists in the attachment and detachment of these patterns and in the modification of their form. The specific patterns of response which develop are differentiated out of uncoordinated activity; specific patterns are individuated as the infant grows.

In the second place, all three of Watson's basic patterns are complex. A careful reading of Watson's original description in the light of more recent knowledge shows that "fear" contains elements of the startle pattern, the Moro reflex, or one of these plus crying (pages 239 and 243). There are also other independently varying bodily changes such as pallor, dilation of the pupil, respiratory changes, and creeping or running away. The escape impulse is sometimes but not necessarily always present in the fear of infants; hence, escape cannot be regarded as an essential component of the fear response.

Thus, Watson's "fear" is exceedingly complex and it can be factored into other patterns and activities which are independently variable. At the present time psychologists have not agreed to designate any particular combination of response elements as "fear."

In the third place, Watson's description of the conditions which evoke "fear" is not completely adequate. Valentine (1930) states that loud sounds do not invariably produce fear, though usually they do. It is not merely the loudness but rather the *suddenness* and possibly the *character* of the sound which induces fear. Further, *movement* may be a factor, especially when it is sudden and unexplained. Movement certainly can arouse fear behavior in older infants and young children. For example, Valentine's daughter at the age of 427 days showed great fear of a teddy bear when it was moved toward her; she turned away from the moving object and trembled in every limb. When the teddy bear was still, she picked it up and kissed it.

In this connection it is of interest to note that Hilgard and Marquis (1940) have criticized the doctrine of conditioned emotion on the

ground that emotional development takes place in a complex social context which has never been dealt with in terms of the principles of conditioning. To illustrate: A child is playing in a room with its mother. The mother spies a mouse and, frightened, shrieks. According to the results of the experiment upon Albert, this child, being frightened by the loud noise, becomes afraid of the mouse, which is present when the noise occurs. But why does the child not fear the mother who is the source of the shriek and closely associated with this loud noise? The child, as a fact, runs to the mother for protection. The mother has prestige in the eyes of the child, and the object of the mother's fear is also the object of the child's fear. But these complex social factors and motivating conditions have not been fitted smoothly into the conditioning prototype.

In the light of these criticisms it is clear that the acute student of modern psychology will think twice before he accepts Watson's rather simple formulation of emotional development through conditioning. Despite our criticisms, however, Watson's work is important historically in that it has stimulated other investigations.

Emotional Development through Conditioning. The way in which an adaptive response is formed out of an original state of emotional upset will be illustrated by reference to a motion-picture film prepared by Culler at the University of Illinois.¹

The film shows a dog harnessed to a Pavlovian frame with the front paw resting upon a grill. Under these conditions a tone is first sounded and then a painful shock is given to the foot. The initial response to the painful shock is highly emotional: There are diffuse movements of the trunk, legs, head, and tail—a struggle as if to escape from the apparatus. The dog yelps. This response to the shock is correctly designated as *painful excitement*. Bridges' term *distress* can also be used to describe it.

During the emotional excitement the dog lifts his foot off the grill and thus terminates the painful electrical stimulation. With successive presentations of the tone and the shock the dog manages more quickly to lift his foot from the grill. The tone serves as a warning signal. After repeated presentations the dog lifts his foot in a calm, matter-of-fact manner and thus avoids the painful shock. There are

¹ The film, which is entitled *Motor Conditioning in Dogs*, was prepared by Professor E. K. Culler in the Animal Hearing Laboratory of the University of Illinois. The film is distributed by the C. H. Stoelting Company, 475 Elder Lane, Winnetka, Illinois.

no longer any signs of emotional upset. The final response is adaptive, non-emotional.

The course of emotional development with Culler's dog is from diffuse emotional excitement to specific, non-emotional response. The signs of emotion (struggling, diffuse motor activity, yelping) disappear gradually as the problem of avoiding the pain is solved. This picture of emotional development is very different from that given by Watson in terms of the attachment and detachment of pre-formed emotional patterns.

Conditioning of Processes in the Glands and Smooth Muscles. It has been repeatedly demonstrated that involuntary changes in glands and smooth muscles can be conditioned. The classical work of Pavlov upon the conditioned secretion of the salivary glands leaves no room for doubt on this point.

An abstract of work by Cahane (1935) contains a hint that internal bodily processes can be conditioned. He reported an average elevation of 0.20 per cent in the blood sugar of three cats after they had been frightened by a dog. On several occasions thereafter a bell was sounded simultaneously with the barking of the dog. It was found that ringing of the bell alone caused an increase in the blood sugar of 0.15 to 0.20 per cent in one of the cats. The other two animals gave inconsistent results.

In this connection it is interesting to note that vascular changes can be conditioned. Menzies (1937) has shown that vasoconstriction can be conditioned to the sound of a bell, to the sound of a buzzer, to the subject's whispered repetition of a nonsense word, to movements and postures of various parts of the body, to a pattern of light. Also vasodilation can be conditioned to the sound of a buzzer at the same time that vasoconstriction in another part of the body is being conditioned to verbal stimulation. With verbal stimulation, whispered words are found to be just as effective as those pronounced aloud. Menzies' work is significant because it shows that the bodily processes controlled by the autonomic nervous system can be linked through ordinary conditioning to such activities as bodily attitudes, gestures, and implicit speech reactions. Such conditioned processes, Menzies found, have great stability and permanence.

There is little doubt, therefore, that involuntary processes in the

glands and smooth muscles can be conditioned. Visceral processes are built into the total response of the organism.

The Stimulus-Response Formula for Emotional Development. The doctrine of conditioning and reconditioning of emotional patterns implies that an emotion is a pattern of response which can be described in terms of stimulus and response.

The stimulus-response formula has been widely applied by psychologists in the description of emotional development. Thus, the development of love attitudes has been described in terms of the attachment and detachment of specific love-response patterns to particular persons and objects. Psychologists have written about the child's fixation or attachment to his parent, about homosexual and heterosexual fixations, about abnormal love attachments—perhaps to some animal or to a fetish. Similarly, the development of fear attitudes has been described in terms of the stimulations which evoke the fear patterns of response. A child, for example, learns to fear snakes and not to fear a kitten. Again, the development of attitudes of resentment can be explained through the conditioning of attack patterns; and the development of attitudes of disgust, through the conditioning of the disgust response.

The stimulus-response formula for emotional development is a very useful one when one's aim is to describe the development of attitudes and habits within the individual. The formula is useful also in the description of the development of patterns of response. But, obviously, the acceptance of the stimulus-response formula does not force us to accept any particular definition of emotion.

VIEWS OF EMOTIONAL DEVELOPMENT

One reason why psychologists have not agreed concerning the nature of emotional development has been the lack of agreement upon the definition of emotion.

We have defined an emotion as *an acute disturbance which spreads to the viscera and which has a psychological origin* (page 51).

Holding to this definition, we observe that there are varying degrees of emotional disturbance. The emotionally disturbed individual is rarely, if ever, one hundred per cent disorganized; he is *more* or *less* disturbed. Even in the strongest passions there appear reflex pat-

terns of response which are well integrated, *i.e.*, organized, and well-integrated impulses to act. Underlying emotional outbreaks are the habits, motives, and attitudes of the individual. These habits, motives, and attitudes have been built up through years of training and experience; for the most part they are integrated, organized.

Hence, while we define emotion as a *disturbed state*, we must not lose sight of the fact that in every disturbance there is evidence of organized, integrated activity. The organized processes, in fact, are commonly referred to by psychologists in distinguishing one "emotion" from another.

A true picture of the relation between organized and disorganized behavior is this. At a given time the behavior of an individual is more or less organized, and more or less disorganized. One can view the same bit of behavior from the point of view of its integration or from the obverse standpoint of disintegration. The first point of view reveals an organized, integrated aspect; the second, a disorganized, disintegrated aspect.

We shall use the phrase *emotional behavior* to designate the total behavior regardless of the standpoint from which it is viewed. The adjective *emotional* implies that the behavior is to some extent disorganized, disintegrated, upset, disturbed. This is the aspect in which we are interested when we are studying *emotion*. But, when examined from another point of view, emotional behavior is found to contain well-organized components—integrated patterns of response, goal-oriented activities. Emotional behavior, also, rests upon integrated attitudes and motives within the individual.

These two main aspects of emotional behavior must be kept in mind in an analysis of emotional development. At every stage of development emotional behavior may be viewed from one standpoint or from the other.

In the following pages we shall consider emotional development, first, from the standpoint of integrated, organized activity and, second, from the standpoint of disintegrated, disturbed activity. The two aspects are different views of a single developmental process.

INTEGRATED BEHAVIOR IN EMOTIONAL DEVELOPMENT

The phrase *integrated behavior* may refer to the simplest reflex or to the most complex adaptive activity. So far as the development of emotion is concerned, the phrase refers to at least three kinds of

fact. First, there are reflexive patterns, such as the rage pattern, crying, and laughing, which arise during emotional excitement. These patterns of response are very similar the world over; they are the physiological constants of emotion. Emotional development may be defined in terms of the maturation of these reflexive patterns, and in terms of the changes in their form and frequency through the process of learning. In the first of the following sections this point will be elaborated and illustrated.

Second, the phrase *integrated behavior* may refer to persistent adaptive activities, such as a flight for one's life, a fight against an enemy, a sexual advance. There is no doubt that these vital activities are intimately associated with emotional outbreaks. Some psychologists, in fact, have differentiated emotions in terms of the purposive activities which accompany them.

Third, the phrase *integrated behavior* may refer not so much to the behavior itself as to the attitudes of the individual which regulate the form of behavior. Conventional modes of behavior are acquired by the individual from his group and cultural environment. These conventional activities are sometimes called "emotions," but we would prefer to refer to them as *social expressions* of acquired attitudes. The attitudes are developed out of the social environment.

The last-mentioned view will be illustrated in the second of the following sections. If we accept the view, emotional development must be regarded as the process by which the individual gradually approximates the conventional behavior patterns of the group—those "emotional" manifestations which are expected of him. Judged in this light, the "emotionally" mature individual is the one who approximates the standard facial expressions, gestures, and actions of his group.

Changes in the Pattern, Frequency, and Causation of Response. As the individual develops, there are marked changes in the pattern or form of response which is made in an emotional situation. There are changes in the frequency of a given response, such as crying or smiling, and changes in the kind of situation which elicits the response. A few examples of these developmental changes are given below.

Changes in the Frequency and Causation of Crying. Lippman (1927) studied the crying of 178 infants, aged four to eighteen

months. He found that the infants cried most frequently when their ages ranged from six and a half to ten months. Within this range there was a gradual increase in the frequency of crying up to ten months; thereafter there was a decrease in frequency.

Bayley (1932) gave sixty-one infants a wide variety of tests to determine the amount of crying during a test period of about an hour. The percentage of time which was given to crying tended to decline after the first month, and reached its lowest point at about four months; then the percentage of crying time increased with age until one year.

These observations of Lippman and Bayley, considered together, indicate that there is not a linear relation between frequency of crying and age of the infant. On the contrary, there are irregular variations in the frequency of crying from month to month. There appears to be a decrease in the frequency of crying from the age of one month to four months; then there is an increase to about ten months; then a decrease to eighteen months. How far these variations depend upon the treatment accorded infants within our culture and upon the particular conditions of observation and how far upon innate factors is not known.

A partial explanation of this irregular development in the frequency of crying lies in the fact that the various factors which evoke crying vary in effectiveness independently as the child grows older. This is illustrated in Fig. 8.

Bayley has listed the causes of crying in infants from birth to twelve months as follows: specific test situations employed in the experiment; continued handling; fatigue at the end of the test; internal conditions such as colic pains, sleepiness, hunger; strangeness of the place and persons; being put down; interference with play activities; postural discomfort; "spoiled" behavior; adverse conditioning.

In the earlier months of infant development, crying resulted mainly from internal organic conditions which yielded bodily pains and discomforts. These internal conditions were recognized in various ways. A colic pain was recognized by its continuity, recurrence, and relief when gas was expelled.

Later the external environment became increasingly potent as the source of crying. A strange situation, unusual methods of handling

the infants, and other environmental factors became increasingly important as causes of crying.

The pattern of crying changes gradually from infancy to maturity. The early cries of an infant are tearless; tears do not appear until the second and perhaps the third month. In the older child and the adult, grief is sometimes expressed by sobbing, an emotional activity in which tears are plentiful. In sobbing the vocalization is reduced

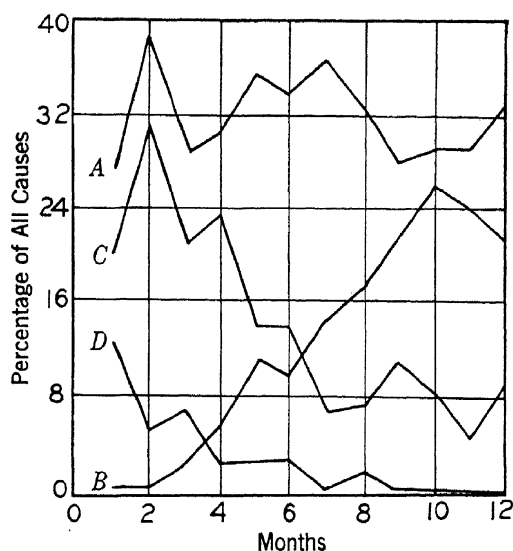


FIG. 8. THE CAUSES OF CRYING IN INFANTS. (After Bayley.)

Four causes of crying are shown: A. Specific test situations. B. Strangeness of places and persons. C. Fatigue at the end of a laboratory test. D. Colic.

to a minimum; but children have not learned to inhibit the vocal element in their crying. This inhibition comes as a result of social training and experience.

Changes in Sensitivity to Pain during Early Infancy. The infant becomes more and more sensitive to pain during the hours following birth. Evidence on this point, taken from Sherman (1929), is presented in Fig. 9.

The vertical line indicates the number of successive painful stimu-

lations with a sharp point which are required to produce crying. The horizontal gives the age of the infant in hours.

These curves show: (1) There is an increase in the sensitivity to pain during the early hours of infancy. (2) In the first hours following birth the face is more sensitive to painful stimulation than the legs.

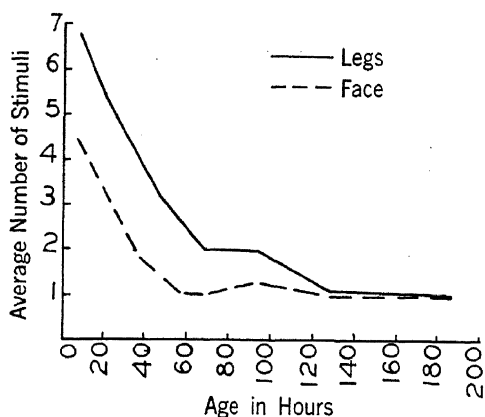


FIG. 9. NUMBER OF PAIN STIMULATIONS NECESSARY TO PRODUCE A RESPONSE. (*After Sherman.*)

Incidentally, Sherman found that the responses to painful stimulation appear earlier in the upper part of the body than in the lower regions. Further, these responses develop more rapidly in the upper than in the lower parts.

Changes in the Frequency of Smiling and Laughing during Infancy. Smiling is absent at birth. According to the observations of M. C. Jones (1926), the pattern of smiling develops between the first and third months as a response to social stimulation.

To induce smiling she used a standard situation (similar to the one described on pages 251-2). The experimenter put the child on a padded table, bent over so that her face was above the child's and about twelve inches away; then she smiled and made a clucking sound. If this failed to elicit a smile, the mother took the experimenter's place and repeated the procedure.

Jones' data upon the first age of smiling follow:

AGE IN DAYS	L CASES	PERCENTAGE SMILING
10-19	1	0
20-29	5	0
30-39	14	8
40-49	17	17
50-59	13	30
60-69	22	58
70-79	26	88
80-89	34	97
90-99	30	100
100-109	24	100

Boys were found to be more precocious than girls in their age of smiling. Colored children were more precocious than whites.

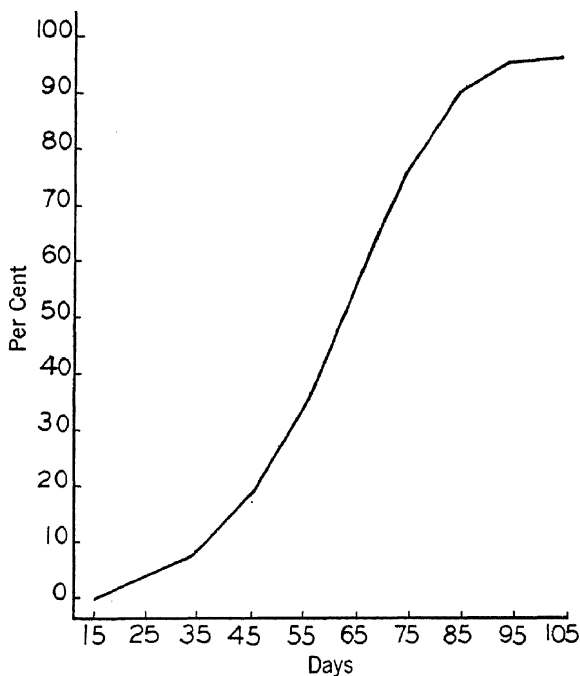


FIG. 10. FREQUENCY OF SMILING IN RELATION TO AGE. (Curve smoothed by Jones from her original data.)

Infants that have been reported in baby biographies tend to fall in the more precocious half of the distribution.

From tests upon 186 infants Jones constructed a smoothed curve. (See Fig. 10.) On the basis of this curve the 25th percentile (45 days), 50th percentile (58 days), 75th percentile (68 days), and the semi-interquartile range (11 days) were determined. The graph shows clearly the gradual increase in the frequency of smiling during the first three months of life. This gradual development of the smile is a fact observed by most mothers. They look for the appearance of the smile and regard it as an early sign of social recognition and of satisfaction.

The detailed observations of Washburn (1929) demonstrate that smiling differs in form with age. She recorded the shape of the mouth in smiling and laughing, and also: the movements of tongue, jaws, eyes, cheeks, nose, chin, brows, head, hands, legs and feet, trunk; and the respiratory changes and character of vocalizations in infants ranging in age from birth to one year. She was able to demonstrate differences in the form of the smile at 12, 20, 32, and 52 weeks.

Laughing, in contrast with smiling, was not found to differ in form at these age levels. Laughing is more stereotyped on the first occurrence and less subject to change from time to time; it is more mechanical. Further, laughing appears chronologically later than smiling.

The tendency to respond by laughing, according to Justin (1932), increases up to the fifth year and decreases slightly in the sixth (when school begins!).

The Cultural Approach to a Description of "Emotional" Development. Very different from such stable response patterns as crying and smiling but still well integrated are some of the activities acquired by an individual from his cultural environment. These conventional modes of acting are sometimes called "emotions."

It is a fact that the growing child learns to conform to group standards of "emotional" behavior just as he acquires the speech, habits, skills, and attitudes which characterize his culture. He learns what to fear, when to weep, when not to laugh, how to show his love according to accepted standards of correctness, whom to admire, how to show resentment within the bounds of good taste, also how to interpret the conventional facial and behavioral signs of "emotion" in others.

Facial expressions, vocalizations, gestures, ways of acting—all are to a large extent voluntarily controlled. Consequently it is necessary

to ask: How far are the apparent emotional expressions acted out for the purpose of communication, to conform to group standards, or just to produce an effect upon others? How far, on the other hand, are such expressions involuntary and reflexive bodily changes which are physiologically determined?

As words differ from group to group but are stable within a given culture, so also the "correct" facial expressions, gestures, or behavior patterns for a given situation vary from culture to culture. To illustrate the point we turn to a study by Klineberg (1938), who read several Chinese novels to discover the phrases which describe the socially approved or "correct" forms of expressive behavior. In his study two points stand out clearly.

First, when the Chinese language describes the *involuntary changes* of emotion in muscles and glands, the account is very similar to that in our own language. For example, in Chinese we read: "Everyone trembled with a face the color of clay"; "Every one of his hairs stood on end, and the pimples came out on the skin all over his body"; "A cold sweat broke forth on his whole body, and he trembled without ceasing"; "They stood like death with mouth ajar"; "They were so frightened that their waters and wastes burst out of them." In these and similar phrases we recognize at once the emotion of fear. Again, in the phrase, "He gnashed his teeth until they were all ground to dust," we recognize anger, or possibly agony. "He was listless and silent," suggests sorrow. "His face was red, and he went creeping alone outside the village," *in the context*, indicates shame.

In many such expressions, Klineberg found, the Chinese forms and the Western are identical. The explanation is that during emotional excitement there are involuntary changes in smooth muscles and glands and there are impulses to act, which are similar the world over. These are the biological constants of emotional excitement. And so far as language refers to these constants, a cross-cultural uniformity is to be expected just as a certain degree of uniformity is to be expected in diverse accounts of a thunder storm or a sunset.

A second point is equally important though very different. Gestures, facial expressions, ways of acting, which can be *voluntarily* controlled, become stereotyped within a cultural group as definitely as the spoken word. A few samples are here given to show the contrast between Chinese and Western phrases.

"They stretched out their tongues," is an expression of surprise

which most of us would not recognize except for the context. "Her eyes grew round and opened wide," suggests surprise or fear to most of us, but to the Chinese it usually means anger. In the form, "He made his two eyes round and stared at him," the phrase can mean nothing but anger to the Chinese. An attitude of hatred is implied by, "He would fain have swallowed him at a gulp." (Compare the Western phrase, "I could eat you up"!)" "He scratched his ears and cheeks," probably suggests embarrassment to us, but in the novel, *Dream of the Red Chamber*, it means happiness. "He clapped his hands," is likely to mean worry or disappointment.

There are all gradations of expression, Klineberg (1940) writes, between purely physiological reflex patterns and socially acquired expressions:

At the one extreme we have the crying of the child in pain—an expression common to all individuals no matter what their culture. At the other extreme we have the language of emotional expression on the Chinese stage, in which standing on one foot means surprise, and fanning the face with the sleeve means anger. In this same category also we may put the custom of the Black-foot Indians to express their mood by the color of the paint used on their faces. "If we felt angry, peaceful, in love, religious, or whatever the mood was, we painted our faces accordingly, so that all who should come in contact with us would know at a glance how we felt." Between these extremes we find every possible degree of cultural patterning. [196]

Certain bodily changes (for example, tear secretion) occur universally in grief, great joy, and similar human emotions; but cultural factors enter in to determine the time, the place, and even the amount of crying which is expected. With us a man is expected to restrain his sobs and tears in public places. The boy is taught that it is "unmanly" for a male to cry openly. But in China, Montenegro, and doubtless in other countries, men weep as readily as women on appropriate occasions.

In the mid-Victorian era and even later, the English gentleman at times would weep openly and conspicuously at theatrical performances, sermons, and other gatherings; this was accepted as socially correct. Thus, a gentleman, upon hearing a rendition of Dickens' *The Old Curiosity Shop*, might weep openly at the story of the death of Little Nell and no one in the audience would think anything of it. Today the styles in weeping have changed!

Most people express joy by a smile, but joyful "emotion" without a smile is also known. Among the Andaman Islanders there is no observable difference between their demonstrations of joy when meeting a long-absent relative and those of grief on the death of one of their number. In both cases a stranger might suppose some great sorrow had befallen them. Weeping is the correct form of greeting.

Thus, conventional expressions of "emotion" vary from culture to culture. It is important to distinguish, as Landis (1924) has done, between *social* and *emotional* expressions.

Two psychological problems are raised by the above evidence. First, what are the innate physiological constants in human emotion the world over? Second, how are the conventional modes of "emotional" behavior acquired by the individual in any given cultural group?

The second problem is one of social learning which is related to the problem of learning to speak one's language. The "emotional" behavior which is *learned* is psychologically similar to that of an actor who skillfully shows his anger, fear, love, disgust, shame, embarrassment, and other "emotion" on the stage. Such "emotion" may or may not be visceralized.

DEVELOPMENT OF THE INDIVIDUAL, VIEWED FROM THE STANDPOINT OF EMOTIONAL DISTURBANCE

Although the above views have much to commend them to the psychologist, they are limited to the integrative aspect of emotional behavior. When an emotion is defined as a state of disturbance or upset, it becomes clear that the above views are partial, not complete.

In the following account we shall examine the other aspect of emotional development. In the analysis two main points should be kept in mind. First, an emotion is a psychological state of disturbance or upset. Second, it is the *individual* who develops emotionally; and emotional development is a gradual change within the *individual*, which change is viewed from the standpoint of emotional disturbances.

Characteristics of Emotional Maturity and Immaturity. As the individual advances from infancy to adult life the characteristics of his emotional behavior change radically. When his emotional development reaches a certain stage, we say that he is emotionally mature.

Although the phrase, *emotional maturity*, has been used by psychol-

ogists, *e.g.*, by Hollingworth (1928), and Morgan (1934), this phrase has not yet been satisfactorily defined. The best way to approximate its meaning is to note changes in emotional behavior which take place as a child develops into an adult and to contrast the emotional responses of children with those of adults. The contrasts described below are based upon the analyses of Hollingworth and Morgan.

One important contrast between the emotional behavior of infant or young child and adult is in the *degree of frustration tolerance*. The infant is intolerant of discomfort and thwarting. Hunger pains, a bath that is too cold or too warm, the prick of a pin, restraint of free movement, uncanny sounds, a toy just out of reach—all these arouse an emotional display in the infant. The older child is more tolerant. Instead of crying like a baby at every mishap, he is able to withstand suffering and disappointment with fewer signs of disturbance.

A two-year-old kicks and screams when refused a second helping of some desired food. Adults take this for granted, for, as they say, "He is just a baby and he behaves like one emotionally." If, however, a six-year-old behaves in the same manner, he is regarded as "naughty." When a nine-year-old kicks and screams in this situation we say he is "spoiled." But such conduct from an adult would be regarded either as hysterical or as a sign of emotional immaturity. If an adult were to scream and kick because refused a second helping at dinner, a psychiatrist would be summoned!

In the ancient pubertal ceremonies of a certain primitive people, physical and mental hardships were inflicted as an ordeal. If the youth refused to submit to the ordeal or yielded to the grilling situation with outcries of fear or distress, he failed in his initiation to adulthood. Possibly some trace of this custom remains in the more modern fraternity initiation. That the capacity to endure pain and to face danger with fortitude is a criterion of emotional maturity is implied in the pubertal ordeal.

A second contrast between the emotional behavior of child and adult is a *decrease in the frequency and degree of emotional upset* as the individual grows up. An adult does not display outbursts of anger as frequently as a child nor does he weep so often. When the adult is emotionally aroused, his response is commonly less intense than that of children. If the adult pinches his fingers, he does not scream as loudly as possible. If insulted, he does not fly into a tower-

ing rage but limits the degree of response, keeping it within bounds. If his hat is blown off, he does not bellow.

As a physiological explanation of this contrast it may be said that the adult manifests a higher degree of cerebral control over midbrain behavior patterns than does the child. This is largely the result of social training. Present-day American culture discourages the overt expression of weeping, anger, and fear; and encourages (or at least does not discourage) smiling and laughing. But on those rare occasions when an adult is genuinely horrified, terrified, or enraged, emotional outbursts do occur with all their primitive intensity. It must not be concluded, therefore, that the adult in our civilization has lost his capacity for emotional outbursts but only that under usual conditions he is better controlled by his cerebral machinery than is the child. The cerebral control of the adult is such that emotional behavior is less likely to arise than with children.

There is another factor. The adult frequently suppresses the outward manifestations of emotion. On this account he reveals emotion overtly with less frequency than does the child.

A third contrast between child and adult is a difference in the *impulsiveness or explosiveness of behavior*. The child "cannot wait" to express anger, joy, or fear. He must respond without delay. In anger he strikes; in joy, jumps up and down; in fear, cries out or runs away; in pain he cries. The adult, in contrast, is able to delay his response and manifests less impulsiveness.

A fourth difference between the emotional behavior of child and adult is found in the *attitudes of self-regard*. Injury to the human ego awakens in the child a self-pity which is out of all proportion to the pity felt by sympathetic onlookers and comforters. This solicitude for self is keenly felt by the injured person.

Writes Hollingworth (1928):

In childhood self-pity is unrestrained. The injury to the person strikes at the very center of the universe. The mature person approximates the "poor-you" attitude in pitying his own injuries and mishaps. He tries to feel no sorrier for himself than others would feel for him, and strives against sinking into the "poor-me" attitude, with its childish appeal for a sympathy from others which they cannot sincerely give. The emotionally mature person does not prey upon the amiability of his fellow men. [210]

This self-pity reflects the fact that the child is self-centered. As his

knowledge of the world increases, he becomes less obviously egocentric. This may be due to the fact that manifestations of self-interest are socially disapproved and that the signs of self-pity are suppressed more in adults than in children.

Finally, *the child in contrast with the adult is more overt in his emotional manifestations*. If an adult is grieved, he refrains from weeping; if angered, he controls the facial muscles which express anger and the impulse to attack; if afraid, he assumes the anti-fear attitude of courage.

An adult may consciously experience an emotion but inhibit its outward manifestations. The child, by contrast, is usually overt, direct, and quite frank in his emotional behavior. How many times have the parents of small children witnessed the following kind of a scene!

Sister: Mama! Bobby kicked me and hit me, and I didn't do anything to him. Boo-hoo, boo-hoo!

Brother: Nancy hit me first and I only got even!

Sister: Mama! Bobby kicked me and hit me and took my crayons away. He's just bad. Boo-hoo! Boo-hoo!

Brother: I don't care. So there (strikes).

Throughout this little drama there is the greatest openness of emotional demonstration.

Summing up the above points, it may be said that the child in contrast with the adult is: (1) less tolerant of discomfort and thwarting; (2) given to more frequent and intense outbursts of emotion; (3) more impulsive, explosive in behavior, and with less capacity to delay his response; (4) more given to self-pity and egocentricity; (5) more overt, direct, frank in his emotional displays. It is also true that adults differ among themselves in these respects, and for this reason the above contrasts should be kept in mind by students of temperamental differences in adults.

Tests of "Emotional" Development. The practical success of the Binet scale of intelligence and the obvious importance of measuring levels of emotional development have led psychologists to attempt a measurement of "emotional age" and to discriminate levels of emotional development. Weber (1930, 1932) and others have worked upon this problem. Unfortunately the work has not as yet

met with much success, mainly because the problem of emotional development has been obscurely formulated. This, in turn, can be traced back to the prevailing lack of precision and agreement among psychologists concerning the definition of emotion.

Perhaps the best attempt to test emotional development has been that of Bridges (1931). Her actual testing scale is made up of items which designate different ways of reacting to a situation. The items are checked always by someone who has personally observed the child's behavior. A few of the items are reproduced below to illustrate the nature of the scale:

- I. *The child has NOT or has:*
 - Cried at naptime
 - Cried when pushed, hit or teased by a child
- II. *The child has NOT or has:*
 - Screamed, cried violently, and jumped about when hurt
 - Run away or withdrawn from dogs
- III. *The child has NOT or has, when required to do something disliked:*
 - Lain on floor and kicked
 - Pouted and drooped lips
- IV. *The child HAS or has not:*
 - Clapped hands in delight at things or events
 - Laughed at his own mistake
- V. *The child has NOT or has:*
 - Wet clothes indoors while engaged in interesting occupation
 - Hurried through one occupation after another in excited interest
- VI. *The child has NOT or has, when finding a task difficult:*
 - Wiggled in seat
 - Sucked thumb or fingers

Bridges' rating scale is divided into six sections, as listed below, each section containing thirty-five to forty-five items.

	<i>Number of Items</i>
1. Distress and tears	45
2. Fear and caution	35
3. Anger and annoyance	45
4. Delight and affection	45
5. Excitement and enuresis	40
6. Mannerisms and speech anomalies	35

In her discussion of this emotional rating scale, the emphasis is

upon the close relation between social and emotional development. Bridges writes:

Social situations both cause and control emotional behaviour and even determine the nature of its development. In fact, emotional development might almost be considered as a form of social development. But since some emotional behaviour is not prompted directly by social situations, and since emotional behaviour in general constitutes a separate psychological problem, it seemed desirable to think of the two aspects of behaviour separately, but to study them conjointly in the children. [5]

Elsewhere we have shown the necessity of distinguishing clearly between social and emotional expressions (pages 13-14). The difference should not be obscured. Social expressions do conform increasingly to group norms as a child develops. Emotional patterns of expression, contrastingly, are more innately determined and more constant the world over.

Bridges reports that in preliminary trials with this scale it was found that *emotional* behavior varied with age less directly than *social* behavior. For this reason the scale has not been much used for exact measurements of the level of emotional development. But the scale is useful, Bridges states, as an instrument for differentiating children according to the degree of their general emotionality and to indicate particular trends.

In addition to this difficulty of distinguishing between social and emotional development there is one other difficulty with Bridges' scale. Her whole genetic theory of emotion implies that specific emotions can be distinguished from each other and that distress, delight, anger, fear, and the other emotions are differentiated from primitive excitement as the individual develops—but the discussion does not clearly and specifically show the criteria by means of which such differentiations can be made. Obviously, if one is to trace the development of anger, one must know how to recognize anger and how to distinguish anger from fear.¹

¹ The genetic study of emotion needs to be carried forward. Possibly a few situations for arousing emotional behavior can be standardized, for example: taking away from the child a toy which is greatly desired, an uncanny noise made mechanically in a controlled situation, or an unexpected fall. Observers could record the child's patterns of response and behavior, as: crying, screaming, smiling, laughing, trembling, urinating, excitement, attack, avoidance, or pouting the lips. With this approach changes in emotional response could be studied in relation to age and other conditions. More actual observations of emotional behavior, made under controlled conditions, are needed to advance our knowledge of emotional development.

THE IDENTIFICATION AND VARIETIES OF EMOTIONAL BEHAVIOR

How can a specific emotion be identified, and how can one emotion be distinguished from another? What are the main varieties of emotional behavior?

The usual answer to these questions indicates that purposive behavior, *i.e.*, well-integrated activity, serves to identify an "emotion" and to distinguish one "emotion" from another. Thus, anger is recognized by a tendency to attack and fight, fear by a tendency to flee or escape, sexual love by an advance toward the mate, disgust by a sickish avoidance, and so on.

Now, if we rely upon purposive behavior to identify an "emotion" and to classify "emotions," we are attending only to the integrative aspect of emotional behavior. This method of identifying and classifying "emotions" does not agree with our basic definition of emotion as a state of disturbance or upset. How can emotions be identified and distinguished if we assume that an emotion is a state of upset?

To illustrate the problem of identification and classification of emotions, we shall consider the emotion of anger. At what age of the developing individual can anger first be recognized *as* anger? By what criteria is anger recognized? How is anger differentiated from fear, general excitement, and other emotions? These and similar questions will be considered below.

Development of Specific Emotions Illustrated by Anger. For the present we shall assume that we know approximately what anger is and how it can be distinguished from other emotions. After considering some of the facts of emotional development, we shall return to the problem of defining anger and distinguishing it from other emotional processes.

An essential feature of anger behavior is retaliation directed against the person or situation which frustrates. Retaliation may take the form of a direct attack to injure or destroy, or the attack may be purely verbal. This point is illustrated below.

A five-year-old boy, at the dinner table, played with his food, eating nothing except the mayonnaise on his lettuce. He asked for a second helping of salad dressing and was told to eat first the vegetables and meat upon his plate. To make matters worse the maid brought in the salad dressing and held a spoon full of it over his lettuce. When the

dressing was taken back to the kitchen, the child cried; it was something he wanted, and the sight of the desired object, followed by its withdrawal, was strongly frustrating. He said in an angry voice, "I'll throw my plate on the floor," and held the food-covered plate in the air as if to throw it. This behavior was observed by those present without comment. Presently he thought better of his action and put the plate down on the table with the words, "Any way, I won't eat my lettuce."

This last remark was retaliative inasmuch as the boy's parents had wanted him to eat and refusing to do so was a way of "getting even" with them. Note also the destructive impulse appearing in the boy's retaliative behavior.

The resentment and retaliative feelings children harbor toward thwarting adults are brought out in the following lines. They are part of an endless chant of a four-year-old boy, a declaration of independence from adults and an impulse to harm those who thwart him:¹

He will just do nothing at all,
He will just sit there in the noonday sun.
And when they speak to him, he will not answer them,
Because he does not care to.
He will stick them with spears and put them in the garbage.
When they tell him to eat his dinner, he will just laugh at them,
And he will not take his nap, because he does not care to.
He will just sit there in the noonday sun.
He will go away and play with the Panda.
And when they come to look for him
He will put spikes in their eyes and put them in the garbage,
And put the cover on.
He will not go out in the fresh air or eat his vegetables
Or make wee-wee for them, and he will get as thin as a marble.
He will not do nothing at all.
He will just sit there in the noonday sun.

Retaliation may take the form of performing some act which has been forbidden by a person in authority. For example, a boy of three violently mussed his freshly brushed hair with both hands when his mother refused him permission to go to a playmate's home. A boy of seven whose mother insisted that he dress himself before coming to

¹ These lines, recorded by a young mother, are quoted from *The New Yorker* as condensed in *The Reader's Digest*, 1940, 36, 73.

the table rushed violently to the table, caught hold of the cloth, and jerked it to the floor, breaking the dishes and glassware. A child of two, when thwarted, ran to the davenport, dragged off the cushions and flung them to the floor, screaming violently during the act. A boy of three, although not an habitual thumb-sucker, sucked his thumb in a conspicuous manner when angry. Apparently the act was intended to annoy his mother who had trained him to avoid thumb-sucking.

Such retaliative impulses become more and more frequent as the young child develops, according to data collected by Goodenough (1931). In the following tabulation the percentages are based upon a grand total of 2124 anger outbursts reported by the college-trained mothers of forty-five children whose ages ranged from seven months to seven years and ten months. Of these children, thirty-four were less than four years old. The percentages of anger outbursts which are reported as showing retaliative behavior are the following:

	UNDER ONE YEAR	ONE TO TWO YEARS	TWO TO THREE YEARS	THREE TO FOUR YEARS	FOUR TO EIGHT YEARS
Boys	0.0	9.4	10.4	25.7	30.0
Girls	0.8	3.8	11.5	25.3	26.3
Both	0.7	6.3	10.6	25.6	28.0

This tabulation indicates that, as age increases, retaliative behavior becomes relatively more and more prominent as a component in the child's outbursts of anger.

Incidentally, the duration of anger outbursts was found to undergo very little change during the first eight years. The following figures are based upon pooled results for these ages:

DURATION	NUMBER OF CASES	PERCENTAGE
Less than one minute	458	24.4
One to four minutes	880	46.8
Five to fifteen minutes	302	16.1
Fifteen minutes and above	171	9.1
Duration not reported	67	3.5

Along with the gradual increase in the frequency of retaliative behavior as the age of the child advances, there is a decrease in the relative frequency of such undirected activities as crying and scream-

ing. This latter aspect of emotional development is shown in the following figures, which are taken from Goodenough's study. Each figure gives the percentage of angry outbursts in which there was a display of random, undirected energy.

	UNDER ONE YEAR	ONE TO TWO YEARS	TWO TO THREE YEARS	THREE TO FOUR YEARS	FOUR TO EIGHT YEARS
Boys	100.0	78.0	73.1	65.2	45.0
Girls	86.9	78.7	83.3	29.6	29.0
Both	88.9	78.4	75.1	59.9	36.3

The more frequent behavioral signs of anger in young children, listed without reference to the presence or absence of retaliation, are the following:

1. *Motor*. Kicking, stamping, jumping up and down, throwing self on the floor, holding the breath, stiffening the body as a means of resistance, refusing to budge, pulling away or struggling, running for help, turning or refusing to swallow (to prevent forcible feeding), pouting, frowning, pulling or pushing, throwing objects, running at the offender, grabbing, pinching, biting.

2. *Vocal*. Crying, screaming, scolding, whining, snarling, inarticulate vocalizations; verbal refusal with or without motor accompaniment, threatening, calling names, arguing and insisting.

Some of these manifestations of anger are clearly retaliative: throwing objects, grabbing, pinching, biting, calling names. Others are the signs of a simple disruption of purposive behavior: jumping up and down, holding the breath, pouting, screaming, snarling. As noted above, the development of anger in the young child is marked by an increase in the retaliative forms of behavior coincident with a decrease of disorganized activity.

There is still another change which occurs as anger develops in the child. The *overt* manifestations of anger reach a maximal frequency during the second year of life. Thereafter there is a rapid decline in the frequency of overt outbursts.

This fact does not mean that human nature is less irascible after the age of two than before this age. Probably it means that within our present culture the *overt* expressions of anger are discouraged at an

early age. When overt expressions of anger are suppressed, there is a strengthening of the *covert* symptoms, such as verbal attack, indirect aggression aimed to hurt the feelings of the enemy, attitudes of resentment, and sulky moods.

Thus, the gradual development of the child's display of anger can be characterized in two ways. First, there is an increase in the relative frequency of retaliative behavior and a corresponding decrease in signs of disorganization. In other words, the behavior of the older child is more definitely channeled and directed toward the frustrating situation than is that of the younger. Second, the older child suppresses the overt symptoms of anger more than does the younger child. The older child is better controlled and conforms more closely to what is expected of him by the group.

In the light of these facts how is anger to be identified and defined? Is anger to be defined as the retaliative behavior which is well integrated and directed against the frustrating situation? There is little doubt that in everyday life anger is recognized by the retaliative, destructive, aggressive behavior. It is this *direction* in behavior which commonly distinguishes anger from diffuse emotional excitement.

If, however, we accept the view that anger and retaliative behavior are identical, we meet with difficulties of definition. Retaliative behavior is well integrated and organized; but we have defined emotion as a *disturbed* state. The emotional disturbance of an angry child is revealed by such activities as screaming, kicking, pouting, turning red, and increased restless movements. But these signs of disturbance are only part of the picture, and we have seen that they become relatively less conspicuous as the child grows older. Anger is actually identified and distinguished from other emotions by the retaliative, aggressive behavior.

If we identify anger and retaliative behavior, however, we not only abandon our original definition of emotion but we also raise new problems. For example, we all know that retaliative behavior may be deliberately planned and calmly executed, as when a man carries a grudge for years, awaiting an opportunity to square accounts with his enemy. Retaliative behavior may be free from visceral upset and similar to any non-emotional activity.

How can we distinguish retaliative acts which are emotional from

those which are non-emotional? This question brings us back once again to the fundamental problem of defining emotion. *Emotion* must be clearly defined before *emotional development* can be accurately described.

The writer suggests that clarity can be gained by speaking of *emotional behavior* rather than of specific emotions. Emotional behavior in one of its aspects is integrated, organized. In another aspect emotional behavior is disturbed, disorganized.

Distinctions among Anger, Fear, and Neutral Excitement.

It has been repeatedly pointed out by psychologists that in fear the behavioral impulse is to escape and in anger to attack and destroy. The orientation of the organism in these emotions is either toward or against some object. In daily life, as well as within technical psychology, this difference in behavior is the means of distinguishing anger from fear. When the patterns of escape and attack are observed to alternate, one must assume that fear and anger have also alternated. A cat, for example, confronted by a dog, arches the back, bristles the hair, shows the teeth, hisses, and spits. Then she turns and runs for a tree. If the animal is cornered, she crouches, all set to spring; the claws protrude; she growls; and with tooth and claw she makes a direct attack upon the enemy. A moment later the cat dashes for a tree, climbs it, and in an instant reaches a branch upon which she remains in a state of highly energized excitement.

During this little drama there are complex bodily changes produced by a sympathico-adrenal discharge. These changes are energizing to an extreme degree, and they sustain the activity of the animal which is demanded by the crisis. These internal bodily changes do not differentiate among fear, anger, and general excitement. So far as we know, the changes in glands and smooth muscles are the same for these three emotional states. The real distinction between anger and fear is one of behavior and one of bodily attitude.

In the cat fight there is first an attack upon the dog (*positive* orientation); then a flight (*negative* orientation). After escaping in a tree, the cat remains in a state of energized excitement, prepared for whatever may arise (*neutral* orientation).

It can be argued from such examples as the above that the differentiation between anger and fear is not made in terms of internal glandular, smooth-muscle, and chemical changes aroused by the threaten-

ing situation but rather: (1) on the basis of overt behavior which is oriented either toward (anger) or against (fear) a threatening object, or which may lack specific orientation (excitement); or (2) in terms of the reflex patterns of response in the skeletal muscles (rage pattern or the escape impulse); or (3) through the attitude of an individual toward or against a danger signal. In anger, the determination is to attack and destroy; in fear, to escape and avoid. At low intensities both anger and fear are observed as mild restlessness without any definite orientation. At higher intensities the primitive biological activities of flight and attack appear.

In view of the above distinctions these questions must once again be asked: Is anger the impulse to attack and destroy, or is it a general state of upset? Is fear an impulse to flee and escape, or is it a general state of disturbance? Can anger and fear be differentiated as disturbed states, or must they be distinguished in terms of organized, integrated activities such as attack or escape?

In considering these questions it is important to point out that, while escape from danger is sometimes calm, smooth, deliberate, and non-emotional, it is often wildly excited and disturbed as with the terrified pussy. The same is true for attack and rage.

For human subjects to designate an experience as *fear*, the presence of an escape impulse is required. In his falling-chair experiment Blatz (1925) found that two components are necessary for an experience to be designated by the subjects as *fear*: (1) complex internal changes, and (2) an overt response of escape made by the skeletal muscles. (See page 385.) Inasmuch as escape is an integrated, organized activity, the question is raised whether in differentiating fear from anger reference must not be made to the integrated, organized aspect of behavior as well as to the general state of upset.

As a matter of fact, the psychologist is always concerned with *emotional behavior* in which there are well-integrated components. When he speaks of specific emotions, such as anger or fear, he identifies and distinguishes these emotional activities in terms of the integrated, organized aspect of behavior. Every specific activity is *more* or *less* adaptive, purposive.

The recognition of this fact is important for a correct understanding of emotional behavior. We have defined an emotion as a disturbed or upset state of the individual. The greater the degree of disturbance,

the greater the emotional component of the process. While holding to this definition, we must recognize that emotional activities are commonly identified and distinguished in terms of the integrated, organized aspects of the total emotional process.

Varieties of Emotional Disturbance. We hold consistently to the view that an emotion is a disturbed state of the individual. From this point of view we ask the same question: How can emotions (as forms of disturbance) be distinguished from each other? Some of the ways in which one emotional disturbance differs from another will be reviewed below.

From a subjective point of view the *distinction between pleasant and unpleasant emotions* is one which can be drawn without reference to purposive behavior. The affective quality of experience serves to distinguish emotional disturbances. Illustrations of pleasant emotions are joy, certain sexual emotions, and laughter. Unpleasant emotions include those commonly called terror, horror, agony, grief, and disgust.

The unpleasant emotions are typically evoked by intense stimulation, frustration, conflict. Pleasantness is usually felt when there is a sudden release of tension through which the individual achieves a goal. Success in an undertaking or the making of a consummatory response typically brings pleasantness.

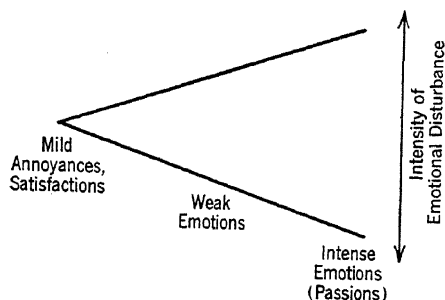
From an objective point of view another kind of distinction is possible. Emotions can be characterized and contrasted by reference to the *degree or level of activity* manifested by the subject. In fear there may be either a great excitement or the opposite—paralysis of action. In joy, there is a heightened level of activity; the joyful child jumps up and down, claps his hands, laughs, and makes other excessive movements. In grief there is usually a lowered level of activity.¹

Another way in which emotions can be distinguished from each other is in terms of the *degree of disturbance* which is aroused. If an emotion is defined as a disturbed state, it is reasonable to distinguish emotions in terms of the degree of disturbance aroused.

No *sharp* lines of distinction can be drawn, however, for there are

¹ There are, of course, variations in the level of activity which have no relation to the degree of emotional excitement or depression. The activity level of laboratory animals varies with non-emotional (especially appetitive) states such as fatigue, sleepiness, illness, hunger, thirst, stage of the estrous cycle, and novelty of the environment.

all gradations of emotional disturbances from minimum to maximum. The following diagram illustrates the relationships:



At the extreme left is the zero point of emotional disturbance. There are wholly undisturbed activities, such as: knitting quietly, repetitive work in a factory, and the calm adding of figures in one's work. Perhaps deep sleep represents the zero point of calm, undisturbed activity. At the left of the diagram are represented the relatively weak affective disturbances which are not sufficiently intense or disruptive to be designated as true emotions. Examples are: mild annoyances, such as the bite of a mosquito, and mild satisfactions, such as smiling at a friend on the street. At the middle of the diagram are represented those weak or moderately intense affective disturbances which are commonly designated as emotions. Examples are: the anger at an insult, the fear of an auto crash, the disgust at the sight of a dead animal, amusement at the pranks and laughter of children, joy over a compliment. At the extreme right of the diagram are represented the highest degrees of emotional disturbance. These highly disruptive emotions were formerly called *passions*. Examples are: rage, horror, terror, agony, great disgust, great joy, the sexual orgasm, great excitement.

Just how disturbing an affective process must be before it can be designated as an *emotion* is difficult to determine. Actually, there are all gradations in the intensity of disturbance from the weakest annoyance or satisfaction to the most overpowering passion.

Possible criteria for recognizing emotional disturbance and for estimating the degree of disturbance are the following: lack of muscular

control as shown in the precision and coördination of movements; retardation of the learning process as shown by various criteria of habit formation; the extent to which the autonomic nervous system is excited as indicated by changes in glands and smooth muscles; the degree to which cerebral functions dominate the total behavior as indicated by the appearance of midbrain patterns of response.

Another way in which emotional disturbances can be distinguished is in terms of the *rôle of central and peripheral processes*. Some emotions are produced by peripheral stimulations of the senses. Loud noises, painful cuts, sudden movement which is unexplained—these stimulations are disturbing emotionally. In a great many emotional outbreaks, by contrast, the central factors play the leading rôle. The individual's understanding and interpretation of the situation is a main condition of affective arousal. For example, to an adult a few loose bricks in the wall indicate that a disaster is impending, but to a child those same loose bricks bring no fear. The sense of danger depends upon one's attitude toward the situation and knowledge about it.

Central processes are dominant in emotional disturbances aroused through memory and imagination and through the individual's identification with the present situation. Recall of past success or failure, of previous joy or conflict, may engender strong emotion. There are feelings of regret and remorse over recalled actions. Anticipation is an important factor in affective arousal. In anxiety there is a foreboding of harm—pain or injury or death or humiliation. There is also joyful expectation, as with the child who anticipates a trip to the circus or with the adult who expects some social recognition or an enjoyable social evening.

Memory and imagination play an enormously important part in the arousal of certain emotions. Identification with the present situation is equally important. The individual identifies himself with the characters on the stage, with the tools he manipulates, with his neighbors, friends, and family. This identification vastly increases the number of possibilities for arousing emotion.

There are doubtless other ways in which the psychologist can distinguish the varieties of emotional disturbance when he holds consistently to the definition of emotion as an acutely disturbed state of

the individual; but enough has been written to indicate how the psychologist can proceed to make distinctions.

Instead of concluding with a rigid classification of emotions in familiar terms (fear, anger, joy, grief, disgust, love, embarrassment, etc.), we end with a statement of the ways in which emotional disturbances differ from each other. They differ in subjective pleasantness and unpleasantness, in the degree of excitement exhibited by the subject, in the degree to which the individual is disturbed, and in the degree to which the central processes dominate the total behavior.

THE NATURE OF EMOTIONAL DEVELOPMENT

Emotional development is ordinary development of the individual considered in relation to emotional behavior. There is nothing unique or mysterious about it. Emotional development is a gradual change in the structural organization of an individual which takes place in accordance with accepted principles of maturation and learning. The process results in modification of attitude, motive, habit-organization, as well as in the building up of conflict states or in their resolution.

There are two obvious phases to the process of emotional development. The first phase includes all the effects of emotional behavior upon the structural organization of the individual. For example, a child who has been bitten by a spider is left negatively disposed toward spiders. The strongly affective experience leaves its mark upon the individual. In this connection we recall the much discussed "law of effect," which states: We are likely to repeat an activity which leads to satisfaction and to avoid an activity which leads to pain or discomfort. The "law of effect" implies that affective processes are related in an important way to learning.

The second phase of emotional development includes all the effects of the individual's psychological organization upon his emotional behavior. How do habits, attitudes, motives, and unresolved conflicts influence emotional reactions? This is an important question; to consider it one must first analyze the attitudes and motives of the individual.

Every individual has acquired specific attitudes which predispose him toward or against certain objects and situations. *Positive* attitudes predispose the individual to attack and to destroy (attitudes of resent-

ment and the will to retaliate), or to make sexual advances (sexual attitudes), or to be friendly (attitudes of liking and of seeking out persons), or to manipulate and explore (attitudes of curiosity). *Negative* attitudes incline the individual away from impending pain or injury (fear attitudes), or against some sickening object (disgust), or against some specific thing or person or activity (attitudes of dislike, aversions).

In studying emotional development the main task of the psychologist is to disclose the ways in which specific attitudes arise, the ways in which they change, and how they affect behavior, especially how the attitudes of a person are related to the emotional outbreaks which he shows.

Emotional conflict results in a change of attitude within the individual. For example, the shock of bereavement leaves the individual in a state of conflict out of which new attitudes develop. Economic disaster, being jilted in love, and other emotional crises often leave the individual with a changed point of view toward the whole of life. Popularly speaking, we say that one person was "embittered" by his experience, another was "mellowed."

Emotional development is part of affective development. The term *affective development* is broader in scope. Affective development is a process which includes the formation and changes of minor likes and dislikes. Many of the affective processes are not sufficiently disturbing to be classified as emotions, but these processes leave their marks upon the individual. In tracing the course of affective development, in the broadest sense, the psychologist seeks to explain: how interests and aversions change with age; how the sources of satisfaction, amusement, and laughter shift from year to year; what aversions, unsolved conflicts, and attitudes of hate, love, resentment, fear, disgust, etc., are present within the psychological organization of the individual; where these attitudes originated and how they show themselves in behavior.

In a word, emotional development is the development of the *individual*. Emotional development is a process through which the individual is changed in his psychological organization. Through emotional development attitudes are built up and changed, conflict states are formed and removed. Emotional development is *individual* development viewed in relation to emotional (more broadly *affective*) disturbances.

CONCLUSION

The available descriptions of emotional development do not agree with each other because psychologists differ in their definition of emotion. The present confusion can be removed by recognizing that there are two main aspects of emotional behavior, and that emotional development can be described from either of two distinct points of view.

If emotional behavior is viewed as an integrated activity, the process of emotional development can be described in terms of stimulation and response. Viewed from this angle, emotional development is: (1) a process of the maturation of reflexive patterns of response (startle, rage, vomiting) and the modification of these patterns through the process of learning; (2) a gradual change in the attitudes (love, hate, fear, disgust) and habits of the individual; (3) change in the motivation of the individual, as shown by purposive activities (attack, flight, mating) and acquired interests or aversions.

There is no doubt that when we distinguish different emotions we ordinarily refer to integrated processes—patterns of response, purposive activities, attitudes, and motives.

If emotional behavior is viewed as an acute disturbance of psychological origin which spreads to the viscera (our definition), another picture of emotional development appears. From this point of view, the first sign of emotional behavior is a diffuse and definitely visceralized excitement. As the individual develops, this diffuse excitement is supplanted by forms of activity that are more and more integrated. In anger, for example, the infant is acutely excited, but the older child is more definitely channeled toward retaliation and attack.

The older child is more stable emotionally than the infant. That is, the older child is less easily disturbed by intense stimulation, by frustration and conflict. Also, he is more controlled in showing joy. Although these developmental differences exist, it is true that at every stage a complete emotional upset is possible and that such upset actually occurs under appropriate conditions.

The writer believes that affective development is an orderly process through which attitudes, habits, and motives are formed and through which conflict states are built up and removed. He believes that the entire process of development should be described from the standpoint of the affective *disturbances* revealed by the developing individual.

Both aspects of emotional behavior—the integrative and the disrupt-

tive—need to be recognized by the psychologist. While holding to the view that an emotion is an acutely disturbed state, we emphasize the point that it is the *individual* who develops, and that emotional development is fundamentally a change of the psychological organization within this individual.

In tracing out emotional development one must always consider two types of relationship and ask two types of question: (1) What does the affective disturbance do to the psychological organization of the individual? How does the disturbance change him? (2) What is the relation between the psychological organization of the individual and his present, or potential, emotional outbreaks?

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The papers by Weber report on an attempt to devise a paper-and-pencil test of emotional age based upon McDougall's psychology of emotion. The scores for emotional age were found to correlate positively with the Otis intelligence scores; the value of r was 0.775. It was concluded that intelligence weights the E.A. (emotional age) scores too heavily.

READING SUGGESTION

For general reading upon emotional development refer to the book by Bridges (1931). Lund (1939), in Chapter 7, deals with the development and control of emotion. Munn (1938), in Chapter 14, discusses emotional development. In Prescott (1938), Chapters 4 and 5 are pertinent; they deal with the patterning and trainability of affective behavior and with affective maturity. M. C. Jones has reviewed the

literature upon emotional development in Chapter 6 of *A handbook of Child Psychology*, edited by Murchison (1933); her bibliography, unfortunately, contains some inaccuracies.

For a study of sex in development the book by Landis and associates (1940) should be consulted because it contains sound and useful information. Chapter 7 in Morgan (1937) is instructive when read in the light of the present discussion; the chapter deals with emotional disorders.

Note upon the nature and effects of Emotional Excitement

Stratton (1923) and Blodgett (1924) have reported observations upon the factors which arouse cattle emotionally. Higginson (1930) and Patrick (1931) have described experiments dealing with the effect of emotional excitement upon learning and activity in the rat. The work of Hall (1934) is interesting in this connection.

CHAPTER V

BODILY CHANGES IN EMOTION

To assume that psychology is concerned only with the outwardly observable manifestations of emotion, and physiology with the internal mechanisms, is quite misleading. The true relation between psychological and physiological points of view toward the bodily changes of emotion may be illustrated by a concrete example.

Cannon (1929)¹ has shown that during emotional excitement the number of red blood corpuscles (erythrocytes) per cubic millimeter of blood increases.

This change, called *emotional polycythemia*, is attributed directly to the action of the spleen. The spleen, a muscular organ, which contracts and expands, is a reservoir for red corpuscles. It renders to the organism the service of quickly increasing the number of circulating erythrocytes and later of storing them away again. Contraction of the spleen occurs in carbon monoxide poisoning, in hemorrhage, in the lessening of the oxygen content in the blood as during asphyxia and muscular exercise and following injections of adrenin and pituitrin, as well as in emotional excitement.

Figure 11 shows the course of emotional polycythemia. The curve is based upon averages of blood counts obtained from nine cats. The scale at the left indicates the number of erythrocytes in millions per cubic millimeters of blood. The base line shows passage of time. Before *O* the initial blood determination was made. Then a dog was allowed to bark at each cat for one minute—between *O* and *O'*. Subsequent blood counts were made at *O'* and at five-minute intervals thereafter, with the average result shown in the curve.

It is obvious from Fig. 11 that an environmental event (barking of a dog) is associated with a specific internal bodily change (increase of red blood corpuscles).

Cannon has interpreted this fact: Erythrocytes carry oxygen from lungs to the heart, brain, active muscles; in a biological emergency

¹ The references and reading suggestions for Chapters V and VI have been combined. (See pages 267-269.)

which might involve a vigorous struggle or a race for one's life, this process is serviceable in that it facilitates energy liberation within the

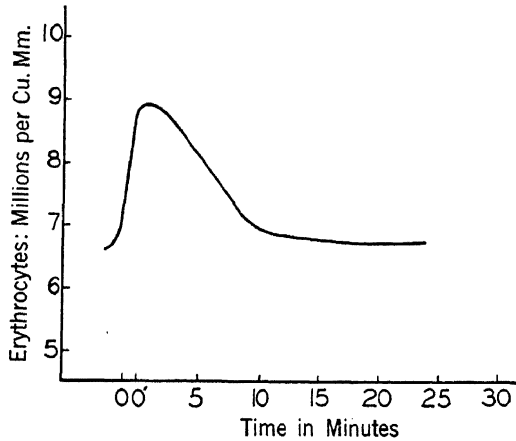


FIG. 11. THE COURSE OF EMOTIONAL POLYCYTHEMIA. (After Cannon.)

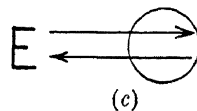
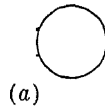
organism. It is part of a general preparation of the body for strenuous activity.

The relation between internal and external manifestations of emotion may be shown by a series of diagrams.

Behavior is a dynamic relation between the organism as a whole (*O*) and its environmental field (*E*). This relation may be symbolized by:

Internal bodily changes, contrastingly, may be represented as occurring inside the skin of the organism in this way:

The figures imply a sharp separation of events inside and outside the skin of an organism. Actually, however, this separation at the surface of the body is made only for convenience in working with a complex problem. There is physical continuity between organism and environment. The complete view may be symbolized in this fashion:



In an important work, Skinner (1938) argues for the establishment of psychology as a pure science of behavior, which behavior is to be

investigated quite apart from and regardless of the processes going on inside the body. Distinct from a science of behavior should be a science of the nervous system, which starts from the direct observation of neural activity and which frames its theoretical conceptions on the basis of its own facts.

Skinner's pure science of behavior is concerned with the relations symbolized in the first diagram, and his science of the nervous system is included within the relationships represented in the second. From the standpoint of scientific method there is a value in restricting the sphere of one's science and working intensively in the area marked off for one's self. Skinner's research is an excellent illustration of this truth.

A somewhat similar limitation upon the scope of psychology has been made by those who rely mainly on the mathematical analysis of test scores rather than upon the facts of physiology. What goes on within the skin of an organism is said to be irrelevant so far as the validity of quantitative relationships is concerned. This point was emphasized by Woodrow (1942) in his presidential address before the American Psychological Association. Woodrow pointed out that quantitative laws in psychology can be formulated in terms of the inducing situation and the subject's response thereto. The situation-response relationships can be expressed by empirical equations which have a validity independent of any particular theoretical interpretation. Between the stimulating situation and the individual's response the psychologist may interpolate determining tendencies, mental sets, neural excitations, instincts, motives, and the like, to suit his fancy. The quantitative laws of psychology have a validity which is independent of these assumed explanatory processes and structures.

When we turn to the analysis of emotion the complete view, shown in the third figure, is essential. Emotion is revealed in overt behavior; but behavior is only one of its aspects. Emotion is also an internal bodily process, but this process is aroused through external events and the physiological processes have vital significance only when considered in relation to those external events.

SPECIFIC BODILY CHANGES IN EMOTION

Physiological psychologists have made extensive laboratory studies of the bodily changes occurring in the various emotions. In the main

such studies have been limited to some specific process such as respiration or circulation of the blood. Bodily processes in which changes during emotion have been investigated are these:

Disturbances in respiration:

Changes in rate or depth.

Variation in the proportion of time given to inspiration.

Cardiovascular changes:

Blood volume in an organ.

Blood pressure.

Chemical changes in blood (pH , glucose, adrenin).

Heart reactions (pulse).

Changes in sweat secretion as indicated by the galvanic response.

Changes in metabolic rate.

Disturbances of gastrointestinal activity:

Salivary and gastric secretion.

Appetite for food.

Vomiting.

Defecation.

Muscular changes which determine:

Facial expression.

Vocalization.

Involuntary movement.

Postures and gestures.

Processes in the urogenital system.

These are bodily changes which can be observed mainly at the surface of the body. But internal physiological processes in their relation to emotions have also been investigated to some extent. Changes in the endocrine glands—adrenal and thyroid glands, the pituitary body, the gonads, and others—have been studied. The only endocrines as yet definitely shown to be aroused in emotional excitement are the central portion (medulla) of the adrenal gland and probably the anterior lobe of the pituitary body.¹ The rôle of neural processes in emotion has also been investigated.

A great quantity of medical and psychological literature dealing with the bodily manifestations of emotion has been reviewed by Dunbar (1935). She organized the facts around the bodily organs or

¹ This statement is made on the basis of a personal communication from Dr. W. B. Cannon.

systems of organs involved in emotional disturbances. Thus, Dunbar's book contains chapters dealing with bodily changes in the musculature, endocrines, cardiovascular system, special senses, skin, and bones.

The reference of bodily changes to particular organs is a convenient way of organizing the facts. One should remember, however, that it is the organism *as a whole* which responds in emotional situations. Intense emotional excitement includes bodily changes in the glands, smooth muscles, skeletal muscles, nerves, as well as chemical modifications of the blood.

Dunbar's main hypothesis is that the individual is a unit, not a mind plus a body. The traumata of experience leave physical effects upon this "psychosomatic" organism. These effects are manifest as disturbances in the functioning of particular organs and organ systems.

Respiration in Emotion. Everyone has observed the disturbances of respiration which occur during crying, laughing, startle, fear, and other states of excitement. The child in a tantrum sometimes holds his breath till he turns blue. In violent laughter expiration becomes spasmodic, and the breath forces the vocal cords to vibrate and emit sounds. In sudden fright there are various signs of respiratory involvement: quick gasping intake of air, holding the breath, dilation of the nostrils. These and other respiratory changes in emotion have been recorded and analyzed by physiologists and psychologists.

Respiration serves two main functions, both of which are disturbed during emotional excitement. The primary service of respiration, necessary to life, is to ventilate the lungs and thus to make possible a gaseous exchange between air and the blood. When there is an increased need for oxygen, as during vigorous muscular activity, this need is met by more rapid and deeper breathing, and by a lengthening of the inspiration phase relative to the total cycle of respiration.

The second and less vital service of respiration—an important factor in social behavior—is to supply the air pressure needed to vibrate the vocal cords. The lungs act as a bellows supplying and regulating the stream of air which in expiration passes between the cords, vibrating them to produce uttered sounds. The outcries of emotion as well as all sounds of speech and song are brought about in this manner by the vocal cords.

The total respiratory cycle is shown schematically in Fig. 12. The two phases—inspiration and expiration—are clearly indicated. The variables in the curve are:

- I , the duration of inspiration.
- E , the duration of expiration.
- $I + E$, duration of the total cycle.
- D , depth of the respiratory movement.

Although the ratio of inspiration to expiration (I/E) has been repeatedly used as an index by students of feeling and emotion, Woodworth (1938) recommends a simpler and more intelligible measure—the I -fraction. The I -fraction shows what proportion of the total time of respiration is used for inspiring air. The fraction is obtained by dividing the duration of inspiration (I) by the duration of the total cycle ($I + E$): $I/I + E$.

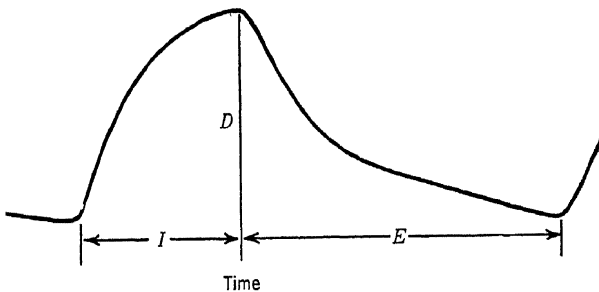


FIG. 12. DIAGRAM OF THE RESPIRATORY CYCLE. (Modified from Woodworth.)

Because all the air utilized by an organism is drawn into the lungs during inspiration and because inspiration is usually the active muscular phase of a respiratory cycle, the I -fraction indicates what proportion of time in the cycle is consumed by the necessary labor of inhaling air.

On the basis of experimental results Woodworth tabulated representative values of the I -fraction:¹

¹ Woodworth worked out a simple reduction table for converting the more usual I/E ratios into I -fraction values. His table is based on the assumption that I and E have been so measured that they comprise the whole cycle. The relationship between the I/E ratio and the I -fraction is a simple arithmetical one.

<i>Process</i>	<i>I-fraction</i>
In speech	0.16
In laughter	0.23
In attentive mental work	0.30
In the resting condition	0.43
In excitement	0.60 +
In posed wonder (in which the subject is asked to imagine a wonderful or surprising situation and to express his feeling by face and gesture)	0.71
In sudden fright	0.75

During speech only one-sixth (0.16) of the total respiratory cycle is taken up in supplying the oxygen necessary to sustain life. In this case the reduction of the *I*-fraction is obviously not an emotional concomitant. Rather it appears to be due to a quickening of the intake of air to avoid interruptions in speech, since vocalizing is dependent upon expired, not inspired, air. An even greater shortening of the inspiratory phase may occur in singing.

In quiet breathing somewhat less than one-half (0.43) of the time is used for inspiration, while in excitement inhalation is relatively prolonged (0.60 +). During sudden fright a quick intake of air, followed by holding the breath, explains an even larger *I*-fraction.

What biological significance has the increased *I*-fraction occurring in emotional excitement? In times of stress when vigorous and prolonged action becomes necessary for self-defense or protection of the young, there is a need for more rapid and complete oxygenation of the blood to speed up metabolism and to counteract the chemical effects of fatigue. This increased oxygenation of the blood is accomplished partly by an increased *I*-fraction and partly by more rapid and deeper respiration, as noted earlier.

Incidentally, there is evidence that the *I*-fraction is increased if the subject attempts to tell a lie and to conceal the fact that he is lying. This is probably because the situation arouses a state of excitement and at the same time calls for a suppression of it. Lie-detecting will be considered in the following section.

Circulatory Changes in Emotion. Circulation of the blood, although continuous throughout life, is far from being constant in nature. Marked changes occur during sleep, exercise, mental activity and after eating, as well as in emotional excitement.

During emotion, as all of us have observed, there are appreciable disturbances in cardiovascular processes. There is the blush of shame or embarrassment (dilation of blood vessels at the body surface), the pallor of fear (vasoconstriction), the rapid pounding of the heart in excitement and rage. We commonly describe emotional experiences with such familiar phrases as: "My heart was in my mouth"; "Everything went black before my eyes"; "My hands were like ice"; "My cheeks were burning." Such experiences are based upon circulatory changes in emotion.

In research upon emotion, laboratory measurements have been made of the following circulatory variables: (1) pulse rate and amplitude, (2) distribution of blood to the various parts of the body, (3) blood pressure, (4) chemical composition of the blood.

A few of the more common techniques and instruments for measuring the first three of these variables are described below. Some of the chemical changes will be noted a little later.

1. *Rate and amplitude of pulse.* The common practice of counting the pulse at the wrist gives only the more obvious changes of rate and rhythm. In the laboratory a graphic record of the pulse can be obtained which shows variations in amplitude and form of pulse wave as well as in rate. This is done by strapping to the radial artery of the wrist an instrument (*sphygmograph*) which presses against the artery and which by means of levers, writes a mechanical record of the pulse wave.

Another instrument (*cardiotachometer*) counts and records the heart beats continuously. In adjusting the instrument, two small electrodes are placed on the chest of the subject, one over the base of the heart and the other near its apex. The electrical changes, which can be referred to the beating heart, are amplified and recorded at some distance from the subject.

Laboratory workers have consistently found that during emotional excitement there is an increase in both rate and amplitude of pulse. Almost any exciting circumstances, such as anticipation of pain in the dentist's chair, an impending examination in the classroom, or winning an important prize, is likely to be associated with an acceleration of heart beat.

2. *Distribution of the blood.* Through constriction or dilation of the blood vessels in any given member of the body the volume of blood

in that member is decreased or increased. The variations in volume of blood in the forearm can be measured by sealing this body part airtight in a large glass or metal tube. As the blood vessels constrict or dilate, the corresponding changes in volume are converted into variations of air pressure, which in turn are communicated through a rubber tube to a recording tambour.

The instrument for registering volume changes in this way is known as a *plethysmograph*. The graphic record obtained from it reveals fluctuations in volume and variations in the pulse wave as well.

Actually, when the blood flows into the forearm it comes from other body parts. Dilation or constriction of the blood vessels in one part changes the total distribution of blood throughout the body. Local vascular changes are only symptoms of the total blood distribution at the time of observation.

In the earlier decades of experimental psychology plethysmographs were used to record the vascular changes during pleasant and unpleasant feeling. It was found that during pleasantness the arteries usually dilated; during unpleasantness they usually constricted. Perfect correlations were not obtained, partly because of the limitations of the introspective technique but more largely because the opposition and contrast between felt pleasantness and unpleasantness depends upon central bodily processes which are much more complex than the relatively simple constriction and dilation of the arteries and not univocally related to them.

3. *Blood pressure.* The most familiar method of measuring blood pressure is that of the physician, who binds a flat rubber bag around the arm, then pumps it up with air until the air pressure cuts off the arterial circulation. Now the air is slowly released from the bag until circulation is resumed, maximum and minimum blood pressure being read on an indicator. The *systolic* pressure is the maximum pressure obtained during a given heart cycle, and the *diastolic* pressure is the minimum. Although there are wide variations with conditions, a representative systolic pressure is 120 millimeters of mercury, and a representative diastolic pressure, 80 millimeters.

Continuous changes in blood pressure have been obtained by a

laboratory instrument which is adjusted to operate midway between the systolic and diastolic pressures. The instrument gives changes in blood pressure but no absolute measure of it.

A typical study of circulatory changes during emotion is that of Scott (1930), who obtained graphic records of systolic blood pressure before, during, and after various emotional episodes. His subjects, 100 college men, witnessed a motion-picture film which presented three emotional episodes separated by approximately ten minutes of neutral story:

1. To arouse sexual emotion there was the usual love scene followed by pictures of a nude girl dancing.

2. For "anger" a scene was presented in which the suitor, who was also the hero, was treacherously betrayed and rejected by his sweetheart, being finally flogged into unconsciousness and thrown out on the street.

3. "Fear" was portrayed by a scene showing the destruction of a city by earthquake. To this was added a sudden loud noise.

With sexual stimulation there was a consistent rise of blood pressure, only one man in the 100 reacting with a drop in pressure. This finding leads to the conclusion that sexual emotion is characterized by a rise in systolic blood pressure.

In his studies with "anger" and "fear" Scott did not find any striking difference between the vascular reactions in these emotions. Some subjects showed a rise and others a fall in blood pressure. Scott concludes: "Anger and fear have no characteristic vascular reaction." This conclusion is not final, however, inasmuch as we cannot know exactly what kinds of emotions were aroused by the film. On the other hand, so far as we know, no one has yet succeeded in distinguishing fear from anger on the basis of vascular and glandular changes, despite much study of these emotions.

Changes in blood pressure have been utilized, also, in tests of deception. If a person tells a lie or tries to conceal something that is important to himself, such as a crime he has committed or a clandestine love affair, there is a sudden, sharp, brief rise in blood pressure.

In a pioneer study of deception, Benussi (1914) employed respiratory changes as an indicator of deception. Later Marston (1917) showed that a rise in blood pressure may betray a lie. In the present-

day art of "lie-detecting," as it has been developed by Larson (1923, 1932), both respiratory and circulatory disturbances are recorded and analyzed.

In practice a man who, to illustrate, is suspected of stealing a horse is connected to the recording instruments. He is then asked a series of questions, some of which are neutral and some pointed, as, "Did you steal the horse?" The interview is carefully planned in advance. If a question embarrasses the subject, there is an involuntary rise of blood pressure and an increased *I*-fraction—telltale signs.

Clearly, the lie-detector does not distinguish truth from falsehood. The instruments indicate involuntary emotional disturbances which must be carefully interpreted in relation to the questions asked during the interview.

The Galvanic Skin Response—An Index of Sweat Secretion. A tremendous amount of human effort has been expended upon the "psychogalvanic reflex," *alias* the "galvanic skin response," *alias* the "electrodermal response," also known more familiarly by initials as the G.S.R.

The fascination which the galvanic skin response holds for psychologists is due, according to Landis (1930), to two things. First, the psychologist would like to believe that at long last he has discovered some method by which he can detect and perhaps measure that kind of human experience commonly known as emotion. The second lure, which is probably the greater, is that in measuring the electrical changes of the body the psychologist makes use of instruments which give a semblance of physical exactness and precision to his research. Galvanometers, Wheatstone bridges—beautifully exact instruments—foster the delusion that emotion is a precisely defined psychological process simply because the instruments of measurement are exact!

When all is said and done, the galvanic skin response turns out to be a delicate index of the amount of secretion of the sweat glands. A slight increase in the activity of these glands moistens the surface with a weakly saline solution, the result of which change is to lower the electrical resistance of the body at the skin. Such a change of electrical resistance can be detected by the swing of a galvanometer if a weak current is passed through the body.¹

¹ There are two electrical effects: (1) a lowering of bodily resistance made manifest when an exosomatic current is passed through the body (the Féré effect); (2) an increase in the electric potential of the body (the Tarchanoff effect), the generation of an endosomatic current.

Action of the sweat glands, however, can be observed without electrical instruments, as Darrow (1932) pointed out. By pressing the finger tip against a glass plate and observing under low magnification the pore of a sweat gland, a globule of sweat can be seen to emerge from the pore and spread out upon the glass. If the sweat cannot evaporate, it returns into its pore.

Activity of the sweat glands is augmented by numerous sensory presentations such as perfumes, bad odors, loud noises, and by emotionally loaded words, *e.g.*, the word "kiss" or the subject's name.

Some psychologists have regarded the galvanic skin response as a dependable indicator of affective processes. The claim, however, is not tenable in view of the fact that the galvanic skin response sometimes appears in neutral activities such as analyzing a geometrical puzzle-figure or turning impulsively from a problem in multiplication to one in division.

Since it has been shown that the presence of the galvanic skin response indicates an augmented activity of the sweat glands, one may inquire: What useful rôle does sweat secretion play in behavior?

One service of sweat secretion to the body is that of cooling the skin and thus helping to regulate body temperature. On a hot day or during vigorous exercise this is obviously an important function. In emergency situations, too, such as those existing when a cat is attacked by a dog or when a man is surrounded by savages, the sweat secretion cools the skin through evaporation. Cooling the body is essential to an animal engaged in a vital struggle.

The interpretation of the rôle of sweat secretion in terms of cooling the body is open to one criticism: Sweat glands are very numerous in the palms and soles of the feet, regions in which evaporation is frequently prevented by contact with solid objects or reduced to a minimum by a cupped position of the hand. Profuse sweating in the palms and soles can hardly be explained in terms of cooling of the body. Does such sweating have another function?

Darrow (1936) has pointed out that moisture on the palm enables the hand to get a firmer grip upon an object. The workman realizes this when he spits on his hand to obtain a better hold of a tool; and the office clerk realizes it when she moistens the fingers with a sponge to aid in counting papers. Moisture gives a firmer hold upon objects.

Among primates a firm hold upon the limb of a tree has obvious utility when an escape has to be made through the forest. The

primitive man who can obtain a firm grasp upon a club or stone has an advantage in combat. Thus, the profuse sweating of palms and soles during emotional excitement has utility other than that of cooling the body. This interpretation fits in with the view of Cannon and the earlier view of Darwin that the bodily changes of emotion are biologically serviceable in the struggle for existence.

Recording of Simultaneous Bodily Changes in Emotion. It is common for investigators to record simultaneously the different bodily changes of emotion. Darrow's technique for registering at the



PLATE V. SUBJECT ADJUSTED FOR SIMULTANEOUS RECORDING OF VOCAL RESPONSE, INVOLUNTARY MOVEMENT OF BOTH RIGHT AND LEFT HANDS, RESPIRATION, SKIN REFLEX, PULSE RATE, AND BLOOD PRESSURE.

The person shown in Plate V is a normal subject who was an employee of the U. S. Public Health Service Hospital, Lexington, Kentucky, at the time the picture was taken. The photograph is reproduced with his permission. The photographs for Plates V, VI, and VII were furnished through the courtesy of Dr. Ralph R. Brown.

same time the subject's vocal response, the involuntary movements of both hands, respiration, the galvanic skin response, pulse rate, and blood pressure, is pictured in Plates V, VI, and VII.

Emotional Evacuation. Evacuation of the bowel and bladder during emotional excitement has been observed in various species, including man.

Through early social training the individual learns to control the eliminative processes, but in extremes of fear or terror sphincter control may be lost. Even in mild anxiety, such as the stage fright before one makes an important speech, there is sometimes an increased urge to urinate or to defecate.

With the rat, an emotional disturbance is produced when the animal is placed in any unfamiliar environment or when he is sub-

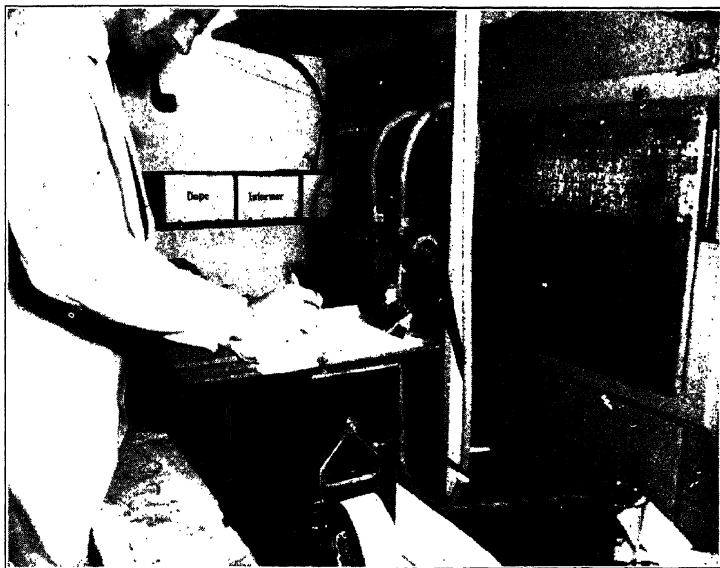


PLATE VI. PHOTOGRAPH SHOWING DARROW'S PHOTOPOLYGRAPH, ONE-WAY OBSERVATION WINDOW AND OTHER DETAILS.

jected to rough handling. This disturbance is manifest by increased frequency of urination and defecation.

In an instructive experiment Hall (1934) has employed frequency of evacuation as an index of the rats' emotional excitement. He placed rats in a circular enclosure, eight feet in diameter, with a food pan in the center. Ordinarily rats prefer running beside a wall to running in an open field, but with Hall's apparatus they had to leave the walls

in order to eat the food located at the center. At first there was much exploration in the outer zone of the apparatus, but with habituation to eating in the center this outer-zone activity decreased.

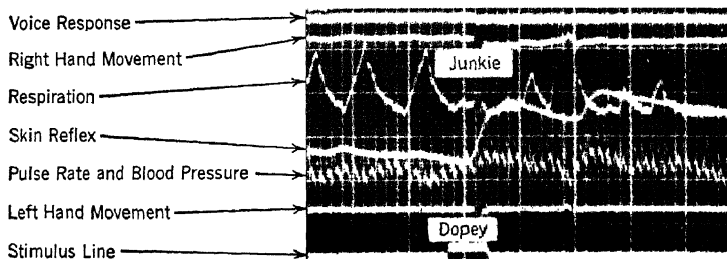


PLATE VII. PHOTOGRAPH OF A RECORD FROM DARROW'S PHOTOPOLYGRAPH SHOWING THE RESPONSES OF A MALE ADULT TO THE WORD "DOPEY" IN VOICE, RESPIRATION, SKIN REFLEX, PULSE AND BLOOD PRESSURE, AND HAND MOVEMENT.

Figure 13 shows the total number of grams of food eaten per day by Hall's group of twenty-six male rats. The curve indicates that,

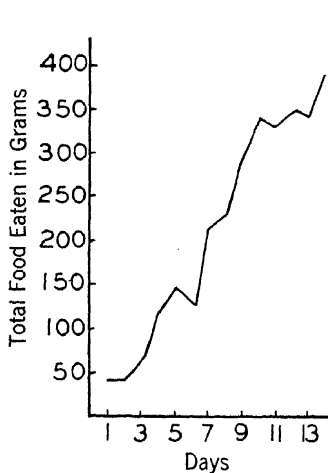


FIG. 13. TOTAL FOOD EATEN PER DAY IN THE CENTER OF AN OPEN FIELD. (After Hall.)

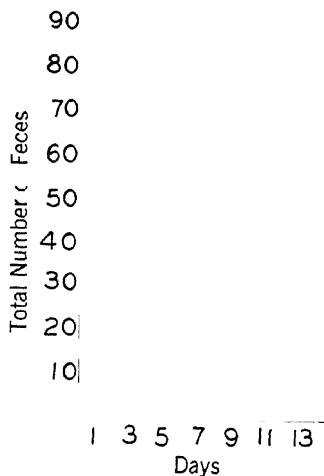


FIG. 14. TOTAL NUMBER OF FECES EVACUATED PER DAY IN THE FIELD. (After Hall.)

as strangeness of the environment decreases (in other words, as familiarity and degree of habituation increase), there is a gain in the

quantity of food consumed. This gain implies a simultaneous decline in the amount of exploratory behavior.

Throughout the course of the experiment, Hall counted the number of feces evacuated on the apparatus during successive experimental periods. Figure 14 presents graphically the total results for a group of twenty-six rats. The curves indicate that, as strangeness of the environment wears off, the frequency of defecation in the situation declines. Similar results were obtained for the frequency of urination.

As long as an animal is excited enough to defecate or to urinate frequently, he will eat but little. In only 20 of the 728 possible concurrences did rats defecate and eat within the same experimental period. Only after they had become sufficiently adjusted to the new apparatus to overcome their tendency to stay near the wall, and only after they left off defecating and urinating, did they commence to eat.

STRUCTURAL ORGANIZATION AND FUNCTION OF THE AUTONOMIC NERVOUS SYSTEM

Although the gross skeletal muscles may come into vigorous action during emotion, a more characteristic feature of emotional disturbance consists of changes in the secretion of glands and in the tonus of smooth muscle. Who has not noted the ready flow of tears, excessive secretion of sweat, inhibition of salivary flow, blushing or pallor, erection of hairs, dilation of the pupils, wide opening and protrusion of the eyes, acceleration of the heartbeat, and similar changes in the activity of glands, smooth muscle, and heart muscle during emotion?

Indeed, for some psychologists a change in the activity of gland and smooth muscle constitutes the *conditio sine qua non* of true emotion.

These changes are evoked through the autonomic nervous system. For this reason a brief survey of the structural organization and function of the autonomic nervous system is essential to an adequate understanding of emotion.

The autonomic nervous system is an aggregation of ganglia, nerves, and plexuses, through which the viscera, glands, heart, and blood vessels receive their innervation. It is made up wholly of *efferent* neurons, *i.e.*, of nerve cells which conduct impulses away from the central nervous system to the organs excited.

Main Structural Divisions. The autonomic nervous system is divided into three main parts, according to the level of the central nervous system at which their fibers emerge. The three divisions are shown schematically in Fig. 15 and are marked at the left of the diagram.

1. The *cranial* is composed of fibers which make their exit from the central nervous system at the base of the brain in several of the cranial nerves.
2. The *thoracolumbar* fibers emerge from the spinal cord at the level of the thorax and in the lumbar region (the trunk of the body).
3. The *sacral* fibers leave the central nervous system at the pelvic level.

Preganglionic and Postganglionic Fibers. Neural excitations from the central nervous system (shown schematically in the center of Fig. 15) spread outwardly through the autonomic fibers to viscera, glands, heart, blood vessels, and smooth muscles in other body parts.¹ Fibers of the cranial division lead without synapses directly to the locality of the organs which are excited by their activity. There they form synapses with shorter neurons lying close to or within these effectors. The distribution of sacral fibers is similar. Fibers of the thoracolumbar division, by contrast, lead to ganglia and plexuses where synapses are formed with other nerve fibers. The latter conduct impulses outwardly to the peripheral structures.

A distinction can be drawn between nerve fibers which conduct excitations to the final synapse (*preganglionic* fibers) and those which carry impulses from the synapse to the effectors (*postganglionic* fibers). In Fig. 15 the *preganglionic* fibers are represented by dash lines and the *postganglionic* by solid lines.

It will be observed that the structures excited through the thoracolumbar division receive the long postganglionic fibers. The adrenal gland is an exception. This gland receives its nerve supply directly from the central nervous system with no intermediate synapse.

In Fig. 15 two chains of ganglia are separated from each other and

¹ Although, as noted, the autonomic system is made up wholly of *efferent* (motor) fibers, *afferent* (sensory) visceral fibers do exist, but they are classified as belonging to the cerebrospinal system.

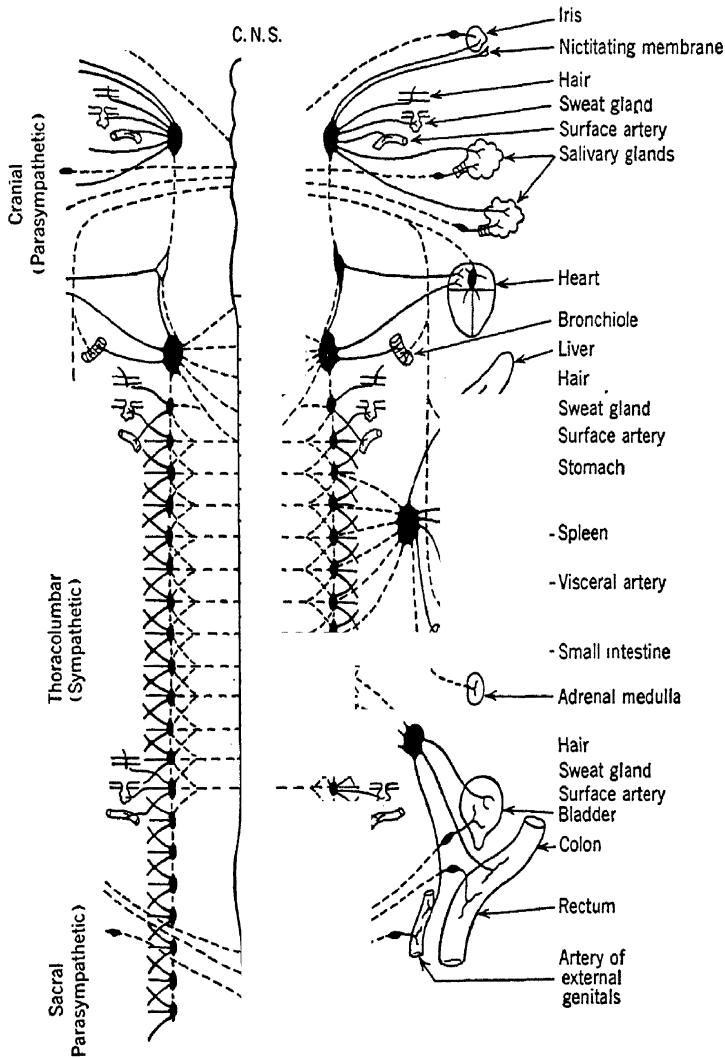


FIG. 15. STRUCTURAL ORGANIZATION OF THE AUTONOMIC NERVOUS SYSTEM. (A schematic diagram after Cannon and Rosenblueth; description in the text.)

shown at the right and left of the centrally placed spinal cord. Actually, these constitute two nerve cords which extend vertically through the neck, thorax, and abdomen, one on each side of the vertebral column. Each nerve cord is composed of a series of ganglia arranged in linear order and the successive pairs of ganglia are bound together by short neural strands.

The Effectors Innervated. As a group the effectors innervated by the autonomic nervous system are concerned with internal bodily changes. For this reason they are sometimes designated (Cannon and Rosenblueth, 1937) as *interofectors*. The skeletal muscles, in contrast, which are innervated by the cerebrospinal system, are concerned primarily with producing effects in the outer environment, and in view of this they have been designated as *exteroeffectors*.

In man the interofectors consist of glands, smooth muscle, and the special muscle of the heart.

Glands are of two kinds: *exocrine* (or those having ducts through which the secretion is poured) and *endocrine* (or ductless glands). The latter secrete directly into the blood. Exocrine glands which are aroused by autonomic activity in emotion are: the lacrimal, the sweat glands, those secreting into the digestive tract (notably the salivary and gastric glands), the pancreas, and possibly the liver. Endocrine glands, innervated by the autonomic and probably aroused during emotion, are the adrenal medulla, the anterior lobe of the pituitary body, and possibly others (page 211).

Smooth-muscle effectors which become active during emotion include those in the vascular system, the bronchioles, the alimentary canal, spleen, ureters, bladder, genitalia, iris, nictitating membrane (beneath the lower eyelid), circular fibers of the ciliary muscle, and the pilomotor (hair-raising) apparatus.

General Functions. During ordinary non-emotional states the autonomic nervous system regulates digestion, emptying of the pelvic organs, respiration, heat production, circulation of the blood, acidity of the blood, glandular activity, and other processes vitally important to the physical welfare of the body. These processes also furnish the organic background of conscious appetites, aversions, and moods.

From the standpoint of function, the autonomic nervous system has been called a "vegetative" and also an "involuntary" nervous system.

Functions of the three main divisions have been described by Cannon (1929) as follows:

The cranial division is a conserver of bodily resources. It regulates the secretion of gastric juice, the action of the salivary glands, and (through the vagus) increases the tone of the alimentary canal; it dilates the arteries which supply the glands; it constricts the pupil; and it slows the beat of the heart. In these services to the organism it is protective, conservative, upbuilding.

The thoracolumbar division is primarily concerned with the regulation of energy expenditure, especially during biological emergencies. This emergency function will be considered in greater detail in a following section.

The sacral division regulates the reflex emptying of hollow organs—the urinary bladder and the rectum. Under normal conditions these organs are stimulated to reflex emptying by a distension due to accumulation of their natural contents.

The sacral nerves also produce engorgement of erectile tissue in the external genitals, which is preliminary to the sexual act. But these nerves have no effect upon the internal organs of generation. At the acme of sexual excitement it is the thoracolumbar nerves which produce ejaculation in the male and a contraction of the uterus in the female.

Functional Antagonism between Divisions of the Autonomic Nervous System. As shown in Fig. 15 some structures—salivary glands, heart, stomach, intestine, bladder, blood vessels of the digestive glands and those of the external genitalia—receive neural innervation both from the thoracolumbar and from one of the other main divisions. When the midpart (thoracolumbar) meets either endpart (cranial or sacral) in any viscus, their effects are characteristically antagonistic, as Cannon (1929) has pointed out.

Inasmuch as the cranial and sacral divisions both mediate bodily changes which are antagonistic to those evoked through the thoracolumbar division, the cranial and sacral divisions are commonly grouped together and regarded as if they constituted a single system.

The term *sympathetic nervous system* is employed as a synonym of the thoracolumbar division. The term *parasympathetic nervous system* is used to designate the cranial plus the sacral nerves of the autonomic. *Para* means “along the side of” or “beside,” and this

designation is appropriate because the parasympathetic nerves are anatomically beside the sympathetic, innervating many of the same organs.

There is a functional antagonism between sympathetic and parasympathetic nerves. This is illustrated in the following tabulation which has been prepared largely on the basis of facts stated by Bard (1934a).

TABLE 5
A SURVEY OF AUTONOMIC FUNCTIONS

SYMPATHETIC		STRUCTURE		PARASYMPATHETIC	
<i>Cranial</i>					
Dilates the pupil	—	Iris	+	Constricts the pupil	
Retracts	+	Nictitating membrane	o		
Projects (exophthalmos)	+	Eye muscles	o		
Inhibits secretion	—	Salivary glands	+	Facilitates secretion	
Erects (pilomotor reflex)	+	Hair	o		
Secretion augmented	+	Sweat glands	o		
Constricts	+	Surface arteries	o	(Dilatation due to central inhibition of pressor effect)	
Accelerates	+	Heart	—	Retards	
Dilates bronchioles	—	Lung	+	Contracts bronchioles	
Secretes glucose	+	Liver	o		
Inhibits: (<i>a</i>) gastric secretion, (<i>b</i>) peristalsis		Stomach	+	Facilitates: (<i>a</i>) gastric secretion, (<i>b</i>) peristalsis	
Constricts (causing it to give off erythrocytes)	+	Spleen	o		
Constricts	+	Adrenal gland	o	(Dilatation due to central inhibition of pressor effect)	
Inhibits smooth-muscle activity	—	Small intestine	+	Facilitates smooth muscle activity	
Medulla secretes	+	Visceral artery	o		
<i>Sacral</i>					
Relaxes smooth muscle	—	Bladder	+	Contracts smooth muscle (empties)	
Relaxes smooth muscle	—	Colon and rectum	+	Contracts smooth muscle (empties)	
Constricts, counteracts erection	—	Artery of external genitals	+	Dilates, permits erection	
Contracts at orgasm	+	Vasa deferentia	o		
Contracts at orgasm	+	Seminal vesicles	o		
Contracts at orgasm	+	Uterus	o		

In the central column are listed bodily structures which are innervated by the autonomic nerves. At the left are given the effects

evoked through the sympathetic division; at the right, effects produced through both divisions of the parasympathetic. To simplify presentation the following symbols are employed:

+ = excitation

- = inhibition

o = no effect

The tabulation demonstrates that where there is double innervation the sympathetic and parasympathetic nerves are antagonistic in their effects. Thus, although there are three main structural divisions of the autonomic, from the standpoint of function there are two basic divisions: the sympathetic and the parasympathetic.

Some writers upon emotion have claimed that the sympathetic nervous system becomes active during unpleasant emotions and that the parasympathetic nerves become active during pleasant ones. This view is not tenable today. One reason is that a sharp discreteness of function between sympathetic and parasympathetic systems does not exist. In the emergency emotions, such as those manifested by a cat in the presence of a barking dog, there is parasympathetic action, but the parasympathetic effects are ordinarily masked by the more dominant sympathetic action.

Kling (1933) concluded that the two divisions of the autonomic nervous system do not function reciprocally but that as a rule there is double excitement and a mixture of symptoms. Gellhorn and others (1940) have presented evidence to show that in normal emotion as well as in "sham rage" (page 238) there is a simultaneous discharge over both sympathetic and parasympathetic nerves.

Thus, emotion is characterized by *autonomic* function rather than by sympathetic function alone.

Diffuse Action of the Sympathetic and Particular Effects of the Cranial and Sacral Nerves. Although the sympathetic nervous system evokes a variety of bodily changes, the system goes into action as a unit. Neural excitations spread simultaneously throughout the entire sympathetic system along all its fibers to multi-form effectors.

The cranial and sacral nerves, by contrast, have a restricted distribution; they innervate particular, individual organs. This specific

action may be illustrated by the fact that the bladder function can be held in abeyance while the rectum is active or vice versa.

In contrasting the functions of the two main divisions of the autonomic nervous system, Cannon has used the analogy of a piano. Sympathetic action is similar to pressing upon the sustaining pedal: An effect is produced on all the vibrating strings. Parasympathetic action is particular and specific. The action of parasympathetic nerves is analogous to striking individual keys of the instrument.

Chemical Agents in Relation to Autonomic Function. During intense emotional excitement the medulla of the adrenal gland secretes adrenin into the blood stream. This secretion produces by direct chemical action most of the bodily changes which are evoked by a neural discharge across the sympathetic nerves. For example, adrenin speeds up the heart and inhibits the peristaltic movements of stomach and intestine—effects which are also produced by sympathetic action. Further, adrenin *sustains* the bodily processes which are initiated through the sympathetic nerves.

Because of this close functional relationship between chemical and neural action, some writers have referred to the *sympathico-adrenal* system as if it were a single functional unit. There are, however, a number of discrepancies. For example, the sweat glands are not excited by an injection of adrenin, whereas a sympathetic discharge causes them to secrete. Again, the smooth-muscle tissue which produces the hair-raising (pilomotor) response, is indifferent to adrenin (unless the tissue has already been sensitized chemically), but it responds to neural action. Also adrenin has effects of its own, such as speeding the coagulation time of the blood and counteracting the effects of fatigue.

In addition to adrenin, there are at least two other chemical agents which are important in relation to the functioning of the autonomic nervous system: acetylcholine and sympathin. These substances are produced in the various glands and smooth muscles themselves—acetylcholine by parasympathetic action, and sympathin by action of the sympathetic. There is evidence that the substance given off at the sympathetic nerve terminals is adrenin and that this substance is changed to sympathin within the effector cells (the cells of glands and smooth muscles).

These substances are thought to be mediators between neural and effector activity. In general, sympathin mediates between sympathetic excitation and the effector processes it evokes, and acetylcholine has a corresponding rôle in parasympathetic function. There are a few exceptions, but this is the rule.

Acetylcholine is very unstable. It is destroyed so rapidly that it cannot be regarded as normally having any action other than that at its local source. If it were to persist in the blood, the effects produced would be incompatible and in no way integrated. This possibility does not exist, however, owing to the extreme lability of the substance.

Sympathin, in contrast, diffuses into the blood stream where it is carried to all parts of the body, producing effects which may persist for ten minutes or more. During a vigorous discharge of the sympathetic nervous system, sympathin is liberated at perhaps all its myriad endings.

Sympathin and adrenin have additive effects. They work together in unifying and synchronizing the operations of the sympathetic nervous system.

CONCLUSION

Emotional behavior may be viewed as a sequence of bodily changes in the skeletal musculature associated with processes in the smooth muscles and glands. Some of these bodily changes of emotion are outwardly observable and others are internal and hidden from ordinary view. Changes in pulse, blood pressure, respiration, sweat secretion, and other bodily processes have been extensively studied in relation to emotional excitement.

The glandular and smooth-muscle changes—essential components of every emotional upset—are evoked through action of the autonomic nervous system. According to recent evidence, both divisions of the autonomic nervous system (sympathetic and parasympathetic) are excited in emotional upset. Hence, increased *autonomic* action rather than increased sympathetic action alone is the true neural index of emotion.

Under quiet, non-emotional conditions the autonomic processes regulate internal bodily functions which are related to digestion,

respiration, reproduction, and other vital activities. During times of stress (as we shall see in the next chapter) the sympathetic nervous system mobilizes the energy reserves of the body for a prolonged and vigorous struggle.

REFERENCES

References and Reading Suggestions for Chapters V and VI have been combined. (See pages 267-269.)

CHAPTER VI

PATTERNS OF ORGANIC RESPONSE IN EMOTIONAL EXCITEMENT

According to a commonly accepted view, an emotion is a pattern of response. Thus, Watson (1919), although he recognized at least three other formulations, stated explicitly in his major definition that an emotion is a *pattern reaction*: "*An emotion is an hereditary pattern-reaction involving profound changes of the bodily mechanism as a whole, but particularly of the visceral and glandular systems.*" Also, Bard (1934a) in his excellent review of research upon the neuro-humoral basis of emotion emphasized that "in his experimental work the physiologist (as distinguished from the student of subjective experience) considers emotions as behavior patterns."

The term *pattern* implies that the separate elements of response appear with a definite spatial form and in approximately the same sequence each time the inducing situation is present.

Emotional patterns are similar to simple reflexes in that both occur with mechanical regularity when the stimulating circumstances are present. And like reflexes the emotional patterns can be conditioned. Emotional patterns are said to differ from reflexes mainly in complexity and generality. The former involve the bodily mechanism as a whole, particularly the glands and smooth muscles, whereas the latter are more restricted.

In considering the pattern-response theory of emotion, we will ignore Watson's well-known trio of fear, rage, and love and start *de novo* with the questions: What patterns of organic response actually occur in or during emotional excitement? How are these patterns aroused?

DESCRIPTION OF THE PATTERNS

In the following sections only those patterns which are well established by laboratory investigation or by direct observation will be

considered. Some of these, incidentally, have been observed in animals which lack a cerebral cortex—a fact which indicates that they are biologically basic.

No claim is here made that any of the following *is* an emotion. The patterns are presented merely as organic responses which occur in or during emotional excitement.

The Sympathico-adrenal Pattern (Emergency Reaction).

In a wide variety of situations which necessitate vigorous action in the interests of self-preservation there is an augmented discharge across the sympathetic nervous system and simultaneously an increased secretion of the adrenal glands. Both the neural discharge and the chemical secretion, as we have seen, evoke profound changes throughout the body.

Some of these processes are clearly observable at the surface of the body as, for example, the bristling of the hair on the back, neck, and tail of a terrified cat, the dilation of the pupils, and the rapid pulse. Internal changes are known only through physiological methods. Illustrations of such internal changes are: the pouring of glucose from the liver into the blood, the discharge of erythrocytes by the spleen, constriction of internal blood vessels, inhibition of the peristaltic movements of the stomach and intestines, chemical changes which determine quicker coagulation time of the blood and which counteract the effects of fatigue.

Adrenal secretion, however, is accelerated in both emotional and non-emotional conditions. Cannon, Britton, and collaborators (1927) have shown that slight exercise—even small movements of the paw and leg when a cat is held on the lap—evoke an increased secretion of adrenin, as revealed by the quickening of the denervated heart. If exercise is more vigorous—such as that of walking around the floor for a minute or two—the flow is increased to a still higher level. Emotional excitement produced through the barking of a dog or by strapping the cat to a holder gives a still greater degree of adrenal discharge. Finally, if the animal is emotionally excited and has to make a struggle, there is the most intense discharge of all.

The biological utility of the widespread organic processes set in motion by sympathico-adrenal activity has been well described by Cannon (1929). He stressed the fact that the physiological changes

of emotion prepare the organism for sustained and vigorous action. Cannon writes as follows:

Every one of the visceral changes that have been noted—the cessation of processes in the alimentary canal (thus freeing the energy supply for other parts); the shifting of blood from the abdominal organs to the organs immediately essential to muscular exertion; the increased vigor of contraction of the heart; the discharge of extra blood corpuscles from the spleen; the deeper respiration; the dilation of the bronchioles; the quick abolition of the effects of muscular fatigue; the mobilizing of sugar in the circulation—these changes are *directly serviceable in making the organism more effective in violent display of energy which fear or rage or pain may involve*. [225–226]

The sympathico-adrenal pattern cannot be identified with any one of the commonly recognized emotions. It is present as a basic component of the total response in rage, terror, great excitement, pain (produced, for example, by painful injury or by asphyxia), as well as in various non-emotional activities which call for great and persistent exertion of the organism, such as running a foot race or working in a rescue squad.

The sympathico-adrenal pattern may be called a compound unit because the processes induced through the sympathetic are not quite identical with those called out by secretion of the adrenal glands. It would be possible, if one wished, to speak of two separate patterns: the sympathetic and the adrenal. But because these two components commonly occur together and are mutually supporting, and further because they have a common service to the organism, it is well to regard the pattern as a compound unit. (See page 230.)

In the older speculative psychologies one sometimes finds reference to a group of invigorating, arousing emotions designated as *sthenic* emotions. Only in recent times, however, has the bodily basis of such emotional energizing been understood. The sympathico-adrenal pattern—aroused to greater or lesser degree—is precisely the bodily factor which is common to the older group of *sthenic* emotions.

Because of the utility of the sympathico-adrenal response in times of stress, Cannon has called it the *emergency* reaction. It would be equally appropriate, however, to designate the pattern as an *energizing* response in view of the fact that energy liberation is regulated, even in non-emotional activities, by the sympathico-adrenal system.

There are all degrees of energy liberation from that produced by quiet exercise to that occurring in a life-and-death struggle.

Rage Patterns. With most animals there appear from time to time patterns of behavior which are unambiguous in their biological meaning—the rage patterns. The entire organism becomes integrated for a fight—for a vigorous, hostile attack upon an enemy.

This hostile behavior is normally part of a total bodily integration which includes the sympathico-adrenal pattern. There are many signs of the latter pattern in an enraged animal. But, as noted above, the sympathico-adrenal pattern is the bodily basis for a whole group of emotional processes of which hostile attack is but one specific form.

Hostile behavior has developed through countless years of evolution. Nature has produced the claws and teeth of the tiger, the antlers of the deer, the spurs of the cock, the fangs of the snake, and the sting and poison sac of the insect as instruments of offense and defense. It is not surprising that internal organs are also organized for a serious life-and-death struggle.

That hostile behavior is primitive and depends upon deeply ingrained neural organization is shown by the fact that a pattern of hostile attack persists after the cerebral cortex has been surgically severed from the brain stem and spinal cord.¹ Reactions of hostile attack have been observed in decorticate dogs by Goltz, Rothmann, Bard, and Culler; in decorticate cats by Dusser de Barenne, Cannon and Britton, and Bard (1934*b*).

In the decorticate cat there is a remarkable exhibit of rage which includes lashing of the tail, arching of the trunk, protrusion of the claws and clawing movements, snarling or growling, spitting, turning of the head from side to side with attempts to bite, rapid panting with mouth open, movements of the tongue to and fro, along with numerous signs of vigorous sympathetic discharge: erection of the hair on the tail and back, sweating of the toe pads, dilation of the

¹ That the nervous system is organized to provide for attack may be illustrated by the following unusual example. A number of years ago a turtle was found in Florida which had two heads and a single body containing only one stomach. A newspaper photograph of the monster showed the two heads fighting each other for possession of a morsel of food. Having two complete heads the monster possessed duplicate midbrain mechanisms for integrating the pattern of attack. And fighting occurred even though both heads were struggling to feed the same stomach!

pupils, large increments in heart rate and arterial pressure, retraction of the nictitating membrane, and (as physiologically determined) an abundant secretion of adrenin and increased level of blood sugar—which level may rise to five times its normal concentration. Such manifestations appear in “fits,” lasting from a few seconds to many minutes with intervening periods of quiet during which a “fit” can be evoked by the slightest disturbance of the animal, such as pinching the tail or the loose skin of the flank.



PLATE VIII. PATTERN OF RAGE IN A DECORTICATE DOG. (Printed by Dr. John T. Cowles from Professor E. A. Culler's film showing the behavior of a decorticate dog. The picture was touched up by Mrs. K. H. Paul.)

With decorticate dogs the pattern is quite similar. There are such manifestations as baring of the teeth, vicious biting and snapping, snarling or growling, struggling. These symptoms are readily elicited by stimulation, *e.g.*, forcibly restraining the animal or rubbing his skin.

A film prepared by Culler shows the behavior of a decorticate dog. The animal walks around and around monotonously in a circular path. A stool placed in the path brings him to rest (frustration with

no aggression); but when the skin is stimulated the animal makes a vicious display of rage. (See Plate VIII.)

Decortication renders both dogs and cats unusually sensitive to patterns of hostile attack. In fact, the rage patterns of animals are more easily elicited with decorticate than with normal animals.

This form of attack has been designated "sham rage" on the assumption that the decorticate subject experiences no conscious emotion and, further, that the hostile attack is purely a reflex and not regulated by the cerebral centers as in normal animals. The phrase, however, serves only to confuse the picture by introducing an element of mystery. As *behavior*, "sham rage" is genuine rage.

Bard reported the observation of a real fight between one of his decorticate cats and another animal. During her decorticate career the cat shared a room with a varying number of normal and partially decorticate cats. Among her cage companions were several quarrelsome beasts that made a practice of striking whenever she came within range, the blows usually landing on her face or the top of her head. Bard noted that this decorticate cat held her ground, raising the forepart of her body and striking out with one or both forefeet. During pauses between attacks—which are characteristic of most forms of feline fighting—she kept one forefoot raised, with claws protruded ready to strike as soon as the combat was renewed. The striking was accompanied by retraction of the ears, growling, spitting, erection of the hair, and other signs of sympathetic discharge. Her blows, it is true, were not well directed toward her more resourceful opponent, but when the latter came close enough, the decorticate animal regularly gave more vigorous and more frequent blows. Bard states that gentle tapping of her nose evoked a hostile response of such a quality that it was advisable to wear gloves during the test.

The rage pattern in the decorticate cat differs from that of the normal animal mainly in being more undirected and automatic. It is noteworthy that the decorticate animal never retreated during one of these bouts. The normal animal has better coördination of movement, superior orientation toward the enemy; also he sometimes retreats.

Some components of the rage pattern, *e.g.*, baring of the teeth, biting, and growling, are as truly reflexive in character as are sneezing, coughing, sucking, yawning, and the postural and righting reflexes. In the decorticate animal the rage response is prompt, uni-

form, and stereotyped, in contrast with that of the normal individual whose behavior is more regulated by the cerebral cortex.¹

Rage patterns, though all similar in many respects, differ from species to species according to the offensive equipment of the animal. One should speak, therefore, in the plural of *rage patterns* rather than of a single pattern.

The Startle Pattern. Everyone has experienced the startle or quick muscular jerk which occurs immediately after some unexpected, intense, or sudden stimulation such as the bang of a gun.

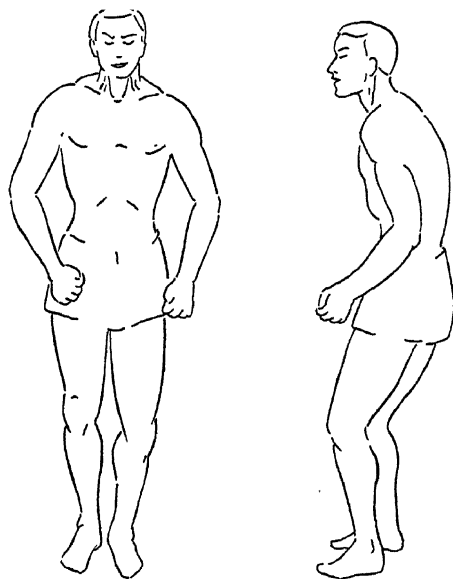


FIG. 16. SCHEMATIC REPRESENTATION OF THE STARTLE PATTERN. (After Landis and Hunt.)

The startle reflex involves skeletal muscles throughout the entire body. The pattern includes blinking of the eyes, forward movement of the head, a characteristic facial expression, raising and drawing

¹ After reviewing the experimental evidence, Bard concludes that the rage pattern is organized by central neural mechanisms which lie within an area comprising the caudal half of the hypothalamus and the most ventral and caudal fractions of the corresponding segments of the thalamus. (Pages 263-264.) Some elements of this pattern can be induced even in the spinal cat, still more in the bulbospinal or midbrain preparation; but only when the midbrain mechanisms are present can the elements be welded together to form the complete rage pattern. The cerebral cortex, as we have seen, is not essential to the pattern.

forward of the shoulders, abduction and pronation of the upper arms, flexion of the fingers, forward movement of the trunk, contraction of the abdomen, and bending of the knees. A schematic representation of these muscular changes is given in Fig. 16.

Details of the facial expressions of startle are shown in Fig. 17. The most noticeable feature of the facial pattern is the closing of the eyes.

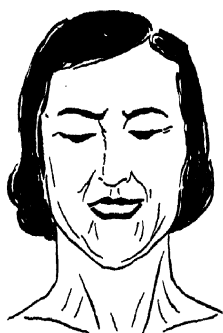


FIG. 17. SCHEMATIC REPRESENTATION OF THE FACIAL PATTERN OF STARTLE. (After Landis and Hunt.)

There is a widening of the mouth as though in a grin, but only occasionally does this lead to baring of the teeth as in the rage pattern. The head and neck are brought forward and down, but the chin is tilted up so that the features are still directed straight ahead. The muscles in the neck stand out prominently.

Not all the elements of this pattern appear in every individual or in a given individual every time that he is startled. The eye-blink always occurs (except with some epileptics). The least constant element in the entire pattern is the pronation of the arms. Instead of pronation (palms of the hands down) there is frequently supination (palms upward).

The pattern as a whole is a general flexion, a protective contraction or shrinking of the individual. The response is usually, but not always, symmetrical.

The startle pattern was first described with scientific precision by Strauss (1929). It has recently been studied in detail by Landis and Hunt (1939), whose work is mainly followed in the present discussion.

Although it is possible to produce startle by non-auditory stimulations, such as an electric shock to the hand or a jet of cold water directed to hit between the shoulders, the shot of a revolver has proved to be most efficacious in laboratory work. The simultaneous application of other stimuli—discharge of a magnesium photoflash bulb or the application of an electric shock—increases the degree of startle; but the reaction evoked by a gun is intense enough for experimental purposes. The use of a gun, moreover, has this advantage that by using a gun of known caliber (0.22 and 0.32 were used) a rough

standardization of loudness is attained. Laboratory workers have employed the gun consistently to evoke startle.

The main recording technique in the investigations of startle has been the use of high-speed motion pictures. The response has been photographed with cameras taking 64 exposures per second; for some parts of their investigation Landis and Hunt employed superspeed cameras giving as high as 300 to 3000 exposures per second. The films were later projected at the usual rate of 16 per second.

In some of the work, levers were attached to the back of the trunk and to the knees so that forward movement of these parts was turned into vertical movement of the levers and thus made more noticeable on the film. Abdominal contraction was measured by a pneumograph attached to a tambour which moved a lever arm.

These laboratory methods have been found necessary because of the great speed with which the pattern develops and vanishes. The response usually comes and goes in less than half a second. The range for the total response is 0.3 to 1.5 seconds.

Startle begins with the closure of the eyelids, both eyes reacting simultaneously. Next there is mouth movement. Then, at about the same time, a movement of the head and neck. The response sweeps downward to shoulder, arm, hand and trunk, and knee.

The following are some of the data which show the time in milliseconds (1 millisecond = 0.001 second) needed for the response to start at different parts of the body:

	<i>Range</i>	<i>Mean</i>	<i>S.D.</i>
Eye-blink	20-54	40	7
Widening of the mouth	52-140	69	17
Initiation of head movement	60-120	83	16
First neck muscle movement	75-121	88	13

The further down the body the response moves, the wider in general are the individual differences in reaction time. This is indicated by the following figures, which give the range of the interval (in milliseconds) between the shot and the first movement:

Shoulder movement begins after	100-150 milliseconds
Arm " " "	125-195 "
Hand " " "	145-195 "
Knee " " "	145-345 "

If the gun is discharged at intervals of one or two minutes, habituation may occur; but there are wide individual differences in the amount of habituation. The habituation effect develops in a direction which is the reverse of that followed in the characteristic spreading of the response: The lower body movements drop out first, then those of the trunk and arms, then head movements, and the eye-blink is the last of all to disappear.

With some subjects the anticipation of a noise reduces the amount of the response; in others it makes little if any appreciable difference. The blink reflex and the facial changes were always present, even in the responses of trained marksmen of the New York Police Department.

Tests with animals were made at the Bronx Zoölogical Park and in the laboratory. Although the pattern is not seen in reptiles and amphibia, it is clearly present in mammals. With animals in the Zoölogical Park the most noticeable addition to the human pattern appears to be flexion of the ears. The ears were frequently laid back close to the skull. Also the flexion of startle sometimes resulted in a crouching posture, with the legs braced as if to spring. The postural response suggests that startle has defensive utility. The startle pattern was observed in every one of the sixteen primates tested. With monkeys and chimpanzees the response was more widespread than in man; *i.e.*, more elements were present.

In man, the startle pattern is most inflexibly patterned. It is a general reflex response of the skeletal muscles to a sudden stimulus. According to Strauss, the form of the pattern is independent of the direction of the sound source and largely independent of the posture of the subject at the time of stimulation.

The pattern is probably organized on a subcortical level. Landis and Hunt report that tests were made upon five primates which had cortical extirpations, and that in none of them was the pattern modified in any way.

Startle is similar to the sympathico-adrenal pattern and to the rage pattern in that it is a general response of the organism. Startle is similar to these other patterns, also, in that it can be broken down into component movements, such as the eye-blink and distinguishable changes in posture.

If we ask whether startle is a true emotional pattern, an interesting

question arises. Some psychologists have assumed that activity of glands and smooth muscles is the criterion of all true emotion; yet startle is a response limited to the skeletal musculature. Startle is a general reflex.

The startle pattern is completed in the fraction of a second, whereas the responses of glands and smooth muscles have a latency well over a second. Ordinarily startle is followed by secondary behavior, such as the development of observant postures, flight, defensive activity, and various signs of overstimulation or annoyance. Startle is frequently the precursor of glandular and smooth-muscle activity but, considered by itself, as we have noted, it is a general reflex of the skeletal muscles.

The Moro Reflex. Closely akin to startle, but distinguishable from it, is the Moro reflex of infants.

The startle pattern is primarily one of flexion, whereas the Moro reflex is one of extension. In the Moro reflex the arms are extended straight out at the sides, at right angles to the trunk, the fingers are extended and spread, the trunk is arched backward, and the head is extended. (See illustration C in Fig. 18.)

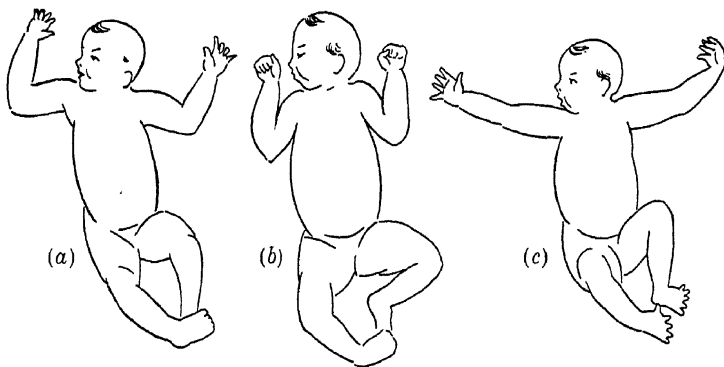


FIG. 18. SCHEMATIC REPRESENTATION OF THE STARTLE PATTERN AND THE MORO REFLEX IN INFANTS. (a) RESTING POSTURE. (b) STARTLE PATTERN. (c) MORO REFLEX. (After Landis and Hunt.)

Following the primary extension of the Moro reflex there is a secondary flexion which has been described as a "clasp" pattern, but it is doubtful whether this is a true clasp response or merely a slow return to the normal position.

One of the main characteristics of the Moro reflex is that it disappears during the early months of an infant's life. The following tabulation, taken from the work of Landis and Hunt (1939) gives a bit of evidence regarding the persistence of the Moro reflex.

TABLE 6
PRESENCE AND CONDITION OF THE MORO REFLEX
IN RELATION TO AGE

Age group	No.	Excellent	Fair	Decayed	Absent
14 days	3	2	1		
28 days	3		1	2	
2d month	6		2	3	1
3d month	9		1	6	2
4th month	6		1	3	2
5th month	5				5

Strauss (1929) believed that in very young infants the Moro reflex takes precedence over the startle pattern and that it is not until the Moro has disappeared that startle is found in the infant's behavioral repertoire. Landis and Hunt, however, are inclined to the view that both of these patterns are present together from birth—that they exist side by side. The startle pattern occurs so rapidly that it is not ordinarily noticed, and the observer's attention is drawn to the slower, grosser, more obvious Moro reflex.

In any event, the startle pattern and the Moro reflex are distinguishable organic patterns. Both are evoked by the stimulation of a loud noise. Hence, it is not the *kind* of stimulation but rather the *age* of the subject, as we have seen, which determines whether the Moro reflex or the startle pattern will be more obvious to an observer. This fact is interesting from the standpoint of emotional development.

Patterns of Escape and Defense. The terms *escape* and *defense* designate forms of protective behavior in which the individual avoids a source of danger instead of attacking it. Animals exhibit a great variety of defensive reaction patterns. In considering the kinds of behavior by which an animal escapes from an enemy or defends itself against impending injury, a distinction must be drawn between reflexive patterns of response and persistent flight. For example, the turtle draws in its head, legs, and tail beneath protective armor. The

clam closes its shell. The child swiftly withdraws his burnt fingers from the candle flame. Obviously these are all relatively simple reflexive patterns.

In contrast are those more complex forms of activity in which an animal persistently avoids an approaching enemy. Birds take to wing. Fish dart away. The deer stands at attention momentarily, then turns and runs.

In the present context our primary concern is with those simple patterns of escape and defense which are akin to reflexes rather than with prolonged purposive flight such as that of a man in a race for his life.

An unusual form of escape reaction has been described by Piéron (1928) in the behavior of certain crustaceans and insects. These animals will amputate a leg or claw when necessary to escape rather than be devoured by an enemy. To illustrate: Suppose that a crab has been tied to a stick by a wire which is attached to one of its claws. If left alone with food near by but out of reach, the crab will die on the spot, being unable to free itself. But if an octopus—the most dangerous of its enemies—is released near the crab, the latter will amputate its claw and escape. This response, which is known as *autotomy*, is induced by the visible presence of a deadly enemy. Species of crabs differ in their readiness to sacrifice a limb. In one species (*Grapsidae*) a sudden seizure of the animal is sufficient to cause the abandonment of its claws, and even a quick movement of the hand, as though to seize it, brings immediate autotomy; whereas with another species (*Carcinus*) only the actual sight of an octopus produces autotomy.

Self-amputation has been observed in various Orthoptera (an order of insects comprising the grasshoppers, locusts, crickets, and similar forms) when the situation requires an immediate escape. When one of these creatures is tied by the tibia, it will die without freeing itself, but it amputates its leg immediately and takes to flight when a dangerous enemy approaches.

More familiar than autotomy, to most of us, is the escape behavior of cats and dogs. Sometimes there is a slinking or creeping away; more often there is a wild dash, as when the terrified cat runs for a tree. Her behavior is adaptive in the sense that she makes for a particular tree, avoids obstacles between it and herself, and maintains a constant orientation away from the dog and toward the tree.

Continued flight does not have the mechanical rigidity and uniformity of a simple reflex; it is persistent goal-oriented activity. To be sure, the coordinated muscular contractions occurring in locomotion are reflexive, but the character and orientation of flight behavior are regulated by the environmental setting. Normal flight, therefore, should be regarded as a form of adaptive behavior rather than as a mechanically rigid reflex. But perhaps the bare undirected impulse to dash away—as the taking to wing of birds or the darting reaction of fish when startled—can be considered a reflexive pattern.

There is some evidence that even decorticate cats and dogs, when stimulated by loud sounds, exhibit a blind impulse to dash away. The decorticate animal runs blindly, colliding with objects in her path. The following observations bearing on this point have been reported by Bard (1934*a*, 1934*b*).

On the eleventh day after surgical decortication, it happened, by chance, that one of the decorticate cats was exposed to the sound made by steam escaping under high pressure. At the time, this animal was walking slowly about and licking the floor. The moment the stimulation occurred, she abruptly retracted and lowered her head, crouched, mewed, and then dashed off, running rapidly in a slinking manner with the head, chest, abdomen, and tail close to the floor. After blindly colliding with several objects in her path, she came to rest in a corner, crouching and mewing plaintively, with eyes wide open, pupils dilated, and hair of the back and tail standing erect. A few minutes after the noise had ceased, the cat resumed her previous behavior. Repetition of the noise a little later produced the same response. Similar avoiding behavior appeared again when a noise was made by water running from a tap through a narrow nozzle.

A second decorticate cat gave the same kind of response to the hiss of escaping steam. The response of a third animal was confined to crouching, retraction of the head, plaintive vocalization, and widening of the eyes and pupils; this animal never dashed off. With a fourth cat the only response observed when stimulated was a twitching of several muscles and erection of the hair.

Two of three decorticate dogs also manifested similar avoidance behavior. The response was a retraction of the head, crouching low to the floor, crawling on the abdomen or shivering. The third animal, interestingly enough, exhibited rage instead of fear when stimulated

by loud sounds. Bard states that rage could be readily distinguished from fear both by its positive characteristics—baring of the teeth, growling, attack—and by the absence of an impulse to slink away or escape from the source of sound.¹



PLATE IX. FACIAL EXPRESSION OF FEAR. (Courtesy of Mrs. Nadie Kohts, Moscow, U.S.S.R.)

Bard's observations show that the blind impulse to dash away was not invariably present in decerebrate cats and dogs. But with every animal there were some signs of autonomic discharge, such as hair

¹ Although Bard designates these avoiding responses as *fear*, it is possible that the term *pain avoidance* would be more appropriate. The hissing or whistling noises which evoked the escape impulses were intense; they may have been above the pain threshold of decorticate cats and dogs. The possibility should be checked by further experiments in which pain thresholds of auditory stimulation are measured.

raising and dilation of the pupil, whether or not the animal dashed away. The observations leave us uncertain as to the precise definition of fear in decerebrate cats and dogs.

A similar uncertainty exists concerning the definition of the fear response in man. Writers who have described fear often mention the wide opening of the eyes with dilation of the pupils. This feature of fear is clearly shown in Plate IX. But the ocular responses are only part of a more widespread response pattern.

Watson's description of the fear pattern, as we noted on page 172, contained elements of startle, the Moro reflex, crying, and sometimes, with older children, an impulse to escape. It is confusing, as Hunt (1939) pointed out, to group together discrete patterns under such terms as *body jerk* or *fear*. What is needed is further observation and analysis of specific patterns of response in the infant, child, and adult, without bias concerning what constitutes the emotion of fear.

Organic Patterns of Sexual Response. An objective account of sexual behavior in animals includes a description of both male and female patterns of response. These patterns are reflexive in their original nature even though in man they may have become modified by social conditioning. The reflexive sexual patterns are clearly revealed in animal behavior.

Female Patterns. When a normal female cat is in estrus, as indicated by a swollen, congested condition of the genital organs and by the fact that males are strongly attracted to her, she behaves in a characteristic manner. This behavior has been described by Bard (1934*b*) as follows:

Resting on forearms and chest with pelvis elevated and tail raised the animal executes alternate treading movements of the hindlegs and emits a curious low sound not heard at other times. This posture and this action are maintained for hours at a time even when the cat is left entirely alone. It can be said of such animals that they are bound by this pattern of behavior, for it is difficult, short of some excessive or unusual disturbance, to induce them to act in any other way. If now the vulval region be gently tapped or rubbed the treading is accentuated, and the pelvis is further elevated and the tail is raised until it is perpendicular to the vertebral axis. If a male be present and does not at once approach, the female is likely to go to him and roll playfully before him. When the male is aroused he attempts to hold the female by the loose skin of the back of the neck and this usually induces a certain amount of spitting and growling. [442]

In the decorticate cat essentially the same behavior can be evoked. Bard reports that on the twenty-ninth day after the final cerebral removal an animal came into heat.

Insertion of a thermometer into the vagina immediately induced loud growling, lowering of head and chest, elevation of pelvis and tail, and treading movements of the hind legs. Except for the growling, the pattern is identical with that shown spontaneously by normal cats in estrus. The behavior was maintained for the few moments during which the thermometer remained in contact with the genitalia. On removal of the instrument the cat rolled over onto her side and, with face upward, playfully rubbed the back of her head and neck against the floor. This sequence of events was repeated on again inserting the thermometer. Furthermore, the typical posture of estrus was assumed and the treading occurred whenever the vulval region was tapped gently or rubbed. Stimulation of other parts of the body failed to produce this behavior; it is significant that insertion of a thermometer into the rectum never evoked the sexual response pattern.

Fulton (1938) has stated that the patterns of sexual behavior are laid down in the spinal cord. While experimenting with spinal dogs he found that a gentle manipulation of the external genitalia of the female elicits contractions of the uterus and probably also increased vaginal secretions. Sherrington and Goltz reported that a spinal bitch was successfully impregnated and delivered a litter of normal puppies after the usual period of gestation.

Male Patterns. With spinal dogs and cats, the male exhibits an erection of the penis on gentle manipulation of the skin of the thighs or the genitals. The same has been reported in the spinal monkey. Ejaculation, also, may be brought about in the same way. In the spinal dog manipulation of the genitalia causes the animal to assume a copulatory posture. With humans, in some cases in which there has been an injury breaking the spinal cord, it has been reported that both erection and ejaculation can occur.

Earlier observations on the copulatory posture of the male frog during the breeding season indicate that once the posture has been developed, actual decapitation of the frog does not disturb the pattern.

In view of the above evidence it is correct to conclude that the sex-

ual behavior patterns of both sexes are organized in the subcortical regions of the nervous system. In this respect sexual responses are very similar to those of rage, startle, and other patterns described in this chapter.

The innate nature of copulatory behavior in the rat has been demonstrated by Stone (1922, 1926). He reared male and female rats in separate cages until they were sexually mature. When a mating test was given, both male and female response patterns appeared at once.

The sexual behavior of man contains response patterns which are similar to reflexes. In the complex sexual activities of civilized man these patterns are often modified or inhibited through social customs and taboos. Esthetic and romantic interests color human sexual behavior; ethical and practical considerations complicate it.

These complications do not concern us here. Despite all cultural factors, such reflexive patterns as erection, copulatory movement, ejaculation, and uterine contractions can be found in fairly constant form throughout the world.

Smiling and Laughing as Patterns of Response. When a child is told that he may have a vacation trip, he jumps up and down and claps his hands in joy. Smiling and laughing, he talks excitedly about the coming event. He is eager to start. Among the varied manifestations of joy two only will be considered in this section: the related patterns of smiling and laughing.

The smile and the laugh of joy differ in degree rather than in kind. A smile may increase into a broad smile and then into vigorous laughter; or, as frequently happens, a paroxysm of laughter quiets down into a smile or other mild expression of cheerfulness.

Smiling and laughing are similar in that both response patterns are evoked by the same general kind of situation. They are similar also in that both are processes in which there is a general relaxation of muscle tonus in the face as well as in other parts of the body.

Laughing differs from smiling in that it is accompanied by vocalizations. The mouth in laughter is widely opened; the vocal cords are adjusted for sound production and the air is forced out by rhythmic contractions of the muscles of respiration.

That smiling and laughing are innate patterns of human response may be illustrated by reference to the case of a ten-year-old girl who had been blind and deaf from birth. Being thus cut off completely

from the visual and auditory stimulations of her social environment, she could not be influenced by the facial expressions and vocalizations of other persons. Goodenough (1932) observed the child an hour or more daily for a period of several weeks.¹ Motion pictures and stills were taken; notes were made on the spot.

On one occasion a small china doll was dropped inside the neck of the child's dress and the immediate response was photographed. The body became tense, particularly the muscles of neck and shoulder; the mouth opened part way; the sightless eyes opened to their fullest extent and the eyebrows were raised. The left hand at once began to grope for the toy. Both the posture and the facial expression indicated what we ordinarily call startled attention.

In the present context we are interested in this child's behavior when, after a struggle, she at last succeeded in reaching the doll. When she got it out she threw herself back in the chair with feet drawn up under her and laughed loudly. Both the hand containing the doll and the empty hand were raised in an attitude of delight. There were peals of hearty laughter, which later faded away leaving a smile of pleased satisfaction.

In this instance there was an element of surprise which created a tension. Recovery of the doll released this tension and laughter occurred.

That surprise and tension-relief are present in the laughter of normal children may be illustrated by the response of the child to tickling. If the element of surprise is lacking, the child does not laugh while being tickled. When he attempts to tickle his own ribs, for example, there is no uncertainty, no surprise, and also no laughter. But the sudden thrust of the tickler, followed by a light contact, brings immediate laughter.

That smiling and laughing are innate patterns is indicated also by the fact that these responses can be elicited during the first year of infancy. In an observational study of smiling and laughing during the first year of life, Washburn (1929) employed ten or more stimulating situations. A sample of the kind of situation which she found to be highly effective in producing *smiling* is this:

The child was placed in the dorsal position, in about the center of the table space, with feet toward the experimenter. The experimenter then leaned over,

¹ See also the report on this case by McCarthy (1929).

placing her hands on the table in the region of the subject's hips. The arms were kept stiff, thus controlling the distance which the experimenter leaned toward the child. The experimenter then "chirruped" to the child. The sound was caused by closing the jaws, opening the somewhat protruded lips, and drawing the air in through the closed teeth while contracting and relaxing the tongue three or four times. The experimenter then smiled and said, "Come on, then, give us a smile," repeating the whole three or four times, if the child did not smile at once. [470]

An example of the kind of social situation used to evoke *laughter* is presented in the following account:

With the subject in the dorsal position, in the center of the table space, feet towards the experimenter, the experimenter grasped his hands in hers and held his arms out at the side, shoulder level, leaving the trunk exposed. The experimenter's head was then playfully shaken from side to side and rapidly ducked until it came into contact with the center of the child's body, when it was immediately withdrawn again. As the head was lowered, "ah-boo" was said, in a long-drawn-out manner. This was repeated at least three times, and more often if the response was increasing in vividness. If there was no response or a negative one, it was repeated later in the period, or the mother was substituted as stimulator. If the child preferred the seated position, the experimenter drew him toward the edge of the table, held his hands and arms out at the side, knelt in front of the table and proceeded as above bringing her head into contact with the child's body about half way between the arms and hips. [473-474]

In general, the situations which arouse smiling and laughing are *social* in nature. This point has been stressed by Kenderdine (1931) in her study of laughter in the preschool child.¹ She reported that out of 223 situations in which laughter was observed, only fourteen or 6.3 per cent occurred when the child was alone. The presence of other persons seems to be an essential element in the occurrence of laughter in children, although the mere presence of others does not mean that there will necessarily be an increased amount of laughter.

Kenderdine found that preschool children laughed most frequently in situations which involved motions—motions made by the child himself or those made by other persons or by toys. Next in effectiveness were situations regarded as socially unacceptable, such as kicking a person, belching, or other bad manners; and third, situations in which an element of humor was appreciated, as in a joke.

¹ In a study of laughter we found (1937) that, with a group of 240 college students, laughing was attributed to social situations in 98 per cent of the instances.

A further study of the situations which arouse laughter will be made in Chapter VIII. In this chapter we are concerned mainly with the response patterns which appear during emotional excitement.

The facial expression of a joyful child is portrayed in Plate X. Laughter in the chimpanzee is shown in Plate II. There is an undeniable similarity between human and simian laughter.

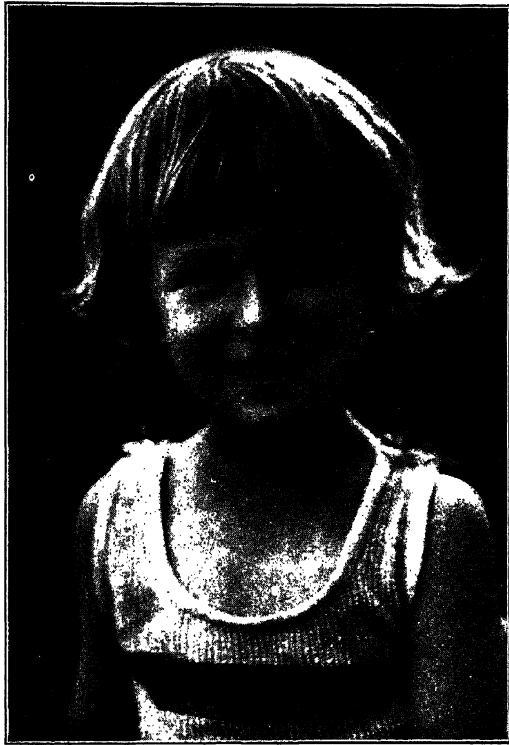


PLATE X. LAUGHING CHILD. (*Courtesy of Mrs. Nadie Kohts, Moscow, U.S.S.R.*)

For a detailed description of the process of laughing, we have selected from Darwin's (1872) classical work upon the expression of the emotions the facts in the following paragraph.

The vocalization of laughter is produced by deep inspirations followed by short, interrupted, spasmodic contractions of the chest, and especially of the diaphragm. From the shaking of the body the head

nods to and fro. Through contraction of the zygomatic muscles, the mouth is opened more or less widely with the corners drawn back and a little up; the upper lip is somewhat raised so that the upper front teeth are exposed; the cheeks are drawn upward. At the same time the orbicular muscles (those surrounding the eyes) are contracted above and below. This forms wrinkles under the eyes and, with older people, at their outer ends, which are highly characteristic both of laughing and of smiling. The eyes are bright and sparkling owing to increased secretion of the lacrimal glands. The nose appears shortened, and the skin on the bridge becomes finely wrinkled in transverse lines, with other oblique longitudinal lines on the sides. There is a well-marked nasolabial fold which runs from the wing of each nostril to the corner of the mouth.

That the bodily pattern of laughing is organized on the subcortical levels of the nervous system is indicated by certain pathological evidence in which brain tumors have destroyed the normal functional relationship between centers in the hypothalamus and those in the cerebral cortex. These unfortunate patients are still able to laugh. They may laugh, however, in inappropriate situations.

One such patient, described by Lashley (1938) in a footnote of a paper dealing with neural centers of emotional patterns, used to laugh spasmodically when reference was made to his very distressing home situation. The patient not only denied any subjective feeling of amusement but claimed that he experienced sadness and depression during the spasms of laughter.

Patterns of Crying and Weeping. In human grief there is a disturbance of normal respiration. There are vocalizations which can be heard as sobbing or crying. Tears are plentiful. In grief there are other bodily changes as well. The "lump in the throat" can be referred to a contraction of smooth muscles in the alimentary canal at the level of the throat. The skeletal muscles are weak and flabby. The bodily posture is altered. The flexor muscles dominate the extensors so that we commonly speak of the person as being "bowed over" with grief. The grief-stricken widow, for example, walks with head and shoulders bent, her eyes fixed on the ground; her step falters.

Grief is a complex emotional state. In it one can recognize various

bodily changes. Only two of these—the vocal-respiratory disturbance and tears—are discussed in the present section.

The order of events in the crying of a Japanese infant has been described by Borgquist¹ (1906) as follows: (1) At the seventh week the mouth is drawn into a square shape; in the twelfth week a protrusion of the lower lip precedes crying. (2) Next the eyes are closed, and (3) the infant makes the vocal sound *â â â*. During the ninth week (4), a reddening of the face is definitely observed. It begins in the face, spreads up over the top of the head, and simultaneously down toward the feet. In the ninth week, also, sobbing is clearly present. Finally (5), there are tears. This infant shed tears within two days after birth, which is exceptionally early.

The vehemence of crying of infants is related to its duration. Bayley's (1932) judgments of vehemence and persistence show the following relationship:

PERSISTENCE	VEHEMENCE		
	<i>Slight whimpering</i>	<i>Moderate</i>	<i>Violent</i>
Very persistent	4	85	204
Average	33	203	21
Intermittent	189	74	11

Although there is a subjective element in these estimations of vehemence, the judgments are probably dependable since they were made at the time of the crying. Differences are so gross that there can be little doubt that the most vehement crying is also the most persistent and that the least intense crying is intermittent (whimpering).

When an infant screams, his respiration is spasmodic and violent. During the respiratory disturbance the shoulders are generally raised. The screaming itself consists of prolonged expirations; there are short and rapid inspirations. The infant's mouth is widely opened and the lips are retracted to produce a squarish form, the gums or teeth being more or less exposed. The eyelids are firmly closed and the skin around the eyes is wrinkled, the forehead being contracted into a frown.

¹ The actual observations, quoted by Borgquist, were made by Dr. Theodate L. Smith, of Clark University.

The musculature which gives the facial expression in weeping is described as follows. The facts of the description are taken from Darwin (1872). The corrugator muscles of the brow contract, drawing the eyebrows downward and inward to produce the vertical furrows of the frown and the simultaneous disappearance of the transverse wrinkles across the forehead. The orbicular muscles contract at the same time as the corrugators and produce wrinkles around the eyes. Then the pyramidal muscles of the nose (*procerus*) contract and draw the eyebrows and skin of the forehead still lower down, producing transverse wrinkles across the base of the nose. The muscles running to the upper lip contract and raise the lip. This action also draws upward the flesh of the cheeks producing a fold on each cheek from near the wings of the nostrils to the corners of the mouth and below.

An obvious characteristic of human crying is the presence of tears; but tears are not essential to crying. Tears are absent in the crying of very young infants and often during the reflexive outcries of bodily pain when freed from the complication of a social factor.

In this connection it is interesting that Goodenough (1932) does not report tearful grief in the behavior of the blind and deaf girl which she observed. She gives, however, the following account of resentment in response to frustration:

Mild forms of resentment are shown by turning her head, pouting the lips, or frowning; sometimes by crouching down into a little heap with head on knees, or by thrusting the thumb and index finger into the nostrils. . . . More intense forms are shown by throwing back the head and shaking it from side to side, during which the lips are retracted, exposing the teeth which are sometimes clenched. This is accompanied by whimpering or whining noises, rising at intervals to short high-pitched staccato yelps. In her most violent outbursts the entire body is thrown back and forth; the feet are twisted around each other or beat violently upon the floor; the vocalizations are intensified and as a rule become shriller in pitch; and the head and chest are beaten with sharp flail-like movements of the arm. These blows are usually struck with the open hand, but at times the clenched fist is used. [331]

In this case there are definite vocalizations but no tears. Tears are lacking also in the distress cries of many animals. The crying of the chimpanzee, for example, is tearless. (See Plate II.) Compare the chimpanzee with the crying child shown in Plate XI.

Tears are by no means limited to the emotion of grief. Lacrimal

secretion occurs in other kinds of emotion as well as under non-emotional conditions. In laughter, for example, the bright eye is due to lacrimal discharge; in the paroxysms of laughter tears may be seen at times to roll down the cheeks. Although as a rule tears are more frequent and copious in weeping than during laughter, this difference in lacrimal secretion is one of degree rather than of kind.



PLATE XI. CRYING CHILD. (*Courtesy of Mrs. Nadie Kohts, Moscow, U.S.S.R.*)

Lund (1930) has noted that tears flow under the following non-emotional conditions: (1) irritation of the eyeball and lid through the presence of a foreign body; (2) irritation of the mucous membrane of the nose, for example, by a whiff of ammonia or by mechanical stimulation; (3) stimulation of the eye by infra-red or ultra-violet

light; (4) during the discharge of various reflexes such as coughing, yawning, sneezing, retching.

In view of these facts it is suggested that the term *crying* be reserved for emotional distress in which vocalization occurs. There are different kinds of crying. Crying occurs during pain, grief, fear, surprise, and other conditions. Crying may or may not be tearful. The term *weeping* should be reserved for emotional distress in which tears are present. Weeping may be silent or nearly so, as when the individual sobs.

Weeping occurs in complex, typically social situations. According to Lund, it is not merely loss or bereavement which brings tears. Rather it is the presence of some alleviating or happy circumstance within an otherwise distressing situation which is the immediate occasion for tears. At a funeral, for example, tears flow when the speaker eulogizes the deceased by saying that he was a fine father to his children, a great-hearted citizen, and so forth. On the screen, weeping is occasioned by the reunion of lovers after some harrowing experience or by the generous and kind remark of a poor, crippled boy. There is regularly some beneficent or alleviating factor in the situations which evoke the tears of weeping.

Contrary to common belief, the deep depression of psychotic individuals is tearless. Lund found that tears of psychotics are the most plentiful in *mixed* emotional states—during the transition from a depressed to an exalted condition.

The Disgust Pattern and Its Relation to Gastrointestinal Tone. The emotion of disgust, according to McDougall (1926), is shown by two impulses. First, there is an impulse to reject from the mouth or otherwise to avoid substances which are foul smelling and often noxious. The second impulse of repulsion is excited by cutaneous contact with slimy and slippery substances. This impulse is a shrinking away of the body, accompanied by a throwing forward of the hands or by a "creepy" shudder.

Although shuddering may be regarded as a pattern of response occurring in disgust, the former of the two impulses (nausea and vomiting) will be taken up first and more in detail because it is a clear-cut pattern. In fact, it may be designated as the basic pattern in disgust.

Subjectively considered, disgust is experienced as a nausea or sick-

ishness which in its extreme form is the act of vomiting. In moderate disgust the mouth is opened widely as if to let an offensive morsel drop out. There may be spitting, blowing out through the protruded lips, guttural sounds such as *ach* or *ugh*. In intense disgust the mouth is rounded to a shape identical with that occurring in the act of vomiting; the upper lip is strongly retracted, producing wrinkles beside the



PLATE XII. FACIAL EXPRESSION OF DISGUST. (*Courtesy of Mrs. Nadie Kohls, Moscow, U.S.S.R.*)

nose. There is retching or actual vomiting. Plate XII pictures the facial expression of disgust in a boy.

Innately, nausea and vomiting are produced by the presence of irritating substances in the stomach. Later, through conditioning, the flavor, odor, appearance or even the conscious recall of these substances may induce incipient or actual vomiting.

The writer recalls that as a boy he walked through a vacant lot where he found the body of a rabbit covered with maggots and giving off the strong odor of decaying flesh. The experience was so sickening that he retched repeatedly. For months thereafter he avoided this lot and found himself nauseated when he went near the spot where the rabbit had been found.

Less intense experiences of disgust are common in everyday life. To a sensitive and highly civilized person it is disgusting to find a fly in the milk, a hair in the butter. The disgust may be due to the thought that these things contaminate the food with filth or that they might be eaten with it.

Certain topics of conversation are definitely taboo at the table, for example, such subjects as vomiting, diseases, and elimination. These topics are sickening to many individuals and for this reason are not discussed at the table in polite society. Of course, a topic which nauseates one person may not disturb another. There are marked individual differences.

Disgust has been studied in an experiment conducted by Brunswick (1924). To obtain a graphic record he trained his subjects to swallow a rubber tube with a small deflated balloon tucked inside it, following the method of Cannon and others. When the balloon was in place, it was inflated through the tube so as to press against the wall of the stomach or duodenum. The changes in air pressure due to gastrointestinal contraction and relaxation were graphically recorded. A similar technique was used in the rectum for recording changes of muscular tone.

To produce disgust, Brunswick used decaying rat flesh. A small piece of rat flesh was placed in a test tube which was corked and allowed to decay. At the proper time the experimenter brought out the tube, uncorked it, and placed the open end directly under the subject's nose. After a wait of ten to fifteen seconds to give the subject time to react to this stimulation, the experimenter announced: "This is a piece of rat flesh allowed to decay." The nature of the odor made the announcement plausible, and the statement sometimes intensified the subject's disgust. After another ten or fifteen seconds of delay the experimenter, with an intentionally shaky hand, allowed the end of the tube to touch the subject's nose. Brunswick states that this apparently accidental contact effectively increased the disgust.

The experiment demonstrates clearly that during the experience of disgust there is an *increase* of gastrointestinal muscle tone. In other unpleasant emotional states—such as those evoked by an unexpected turning off of the light, shooting a pistol in the dark, threatening with a pistol and then giving an unanticipated shot into the air, dashing water into the subject's face—in all these states the tone of the stomach is *decreased*. Disgust, therefore, includes an effect upon gastrointestinal tone which is opposite to that of other disagreeable emotions.

Brunswick suggests that this effect for disgust may be interpreted as the combination of a specific "disgust effect" plus a general "unpleasantness effect"; that opposed contraction and relaxation may occur in two different axes of the stomach, or in different groups or layers of muscle fibers, or in different parts of the gastric wall. Be that as it may, the important point is that the disgust effect on gastrointestinal tone is different from that of other unpleasant emotions.

From the standpoint of the pattern-response theory of emotion one might well identify disgust with nausea, including incipient as well as overt vomiting. The question, *What disgusts us?* then becomes, *What environmental conditions evoke the nausea-vomiting type of response?* Another question is this: *How, through conditioning, is this innate response modified and attached to situations not originally producing it?*

Returning now to McDougall's view that in addition to the characteristic disgust response to foul odors and tastes there is also an instinctive revulsion against slimy contacts with worms, slugs, frogs, and the like, it is clear that if we identify disgust with the nausea-vomiting pattern, slimy contacts are disgusting only in so far as they arouse the tendency to vomit. In this connection one recalls Brunswick's finding that cutaneous contact with the tube of decaying rat flesh increased the disgust. If the nature of the object is not recognized, surprise or fear is more likely to be induced than disgust. On the other hand, if the slimy contact produces a shudder (as it may), this is a pattern of response certainly distinguishable from nausea and incipient vomiting.

The term *disgust* is sometimes applied to sexual situations, but it is an open question whether the word, so used, does not refer simply

to an aversion to the sexual act, an attitude resting upon some unfortunate sex experience.

Novelists, further, sometimes use the word *disgust* to describe the response to complex experiences such as seeing a master flog a slave or seeing a native island girl tortured for infidelity. The stories about cruel treatment of prisoners are said to disgust us. When such experiences produce sickness or actual vomiting, then it is psychologically correct to refer to them as genuinely disgusting. But if sickness is not aroused, the term *horror* may more correctly describe the emotional upset.

GROSS ANATOMICAL LOCATION OF CENTERS WHICH COORDINATE EMOTIONAL RESPONSE PATTERNS

In its embryonic development, the nervous system of man presents something like a synopsis of early evolutionary history. The first appearance of the nervous system in the embryo is a neural groove which forms along the dorsal (back) side of the organism. With growth, this groove closes over, first near the middle of the body, and from this region the closure proceeds in both directions. A neural tube is thus formed.

During the first few weeks of development, bulges appear at the head end of the tube and there is a folding back of one part over another. One of these head regions (the pallium) becomes the cerebrum in the adult organism; this structure grows to such size that eventually it covers over and hides from view all other portions of the brain.

A reconstruction of the brain of a human embryo at the age of five weeks is shown in Fig. 19. The figure presents: a lateral view with some of the gross structures, marked *A*; a median sagittal section, showing the original tubular structure *B*; 19*B* roughly resembles the diagram of a vertebrate brain with cerebral hemispheres lacking. This similarity is due to the fact that the pallium has not yet grown to such an extent that it covers the other structures.

In the adult brain the neural tube remains in the form of ventricles within the brain and as a minute neural canal within the spinal cord. In the adult brain, however, the external parts visible to the naked eye are largely the bulges and folds which conceal from view what is left of the embryonic neural tube.

Figure *A* shows the diencephalon, a general region of the nervous system, just behind the pallium. In this region are the thalamus and

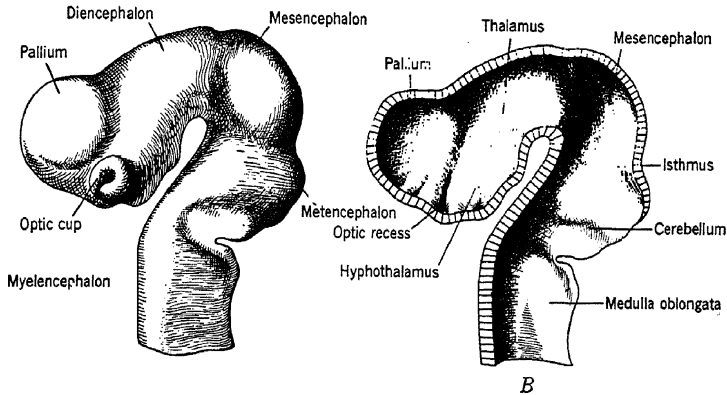


FIG. 19. RECONSTRUCTION OF THE BRAIN OF A HUMAN EMBRYO AT THE AGE OF FIVE WEEKS. (Drawn by Mrs. K. H. Paul from the figure originally prepared for Prentiss, *A Laboratory Manual and Text-book of Embryology*, 1915.)

the hypothalamus, represented in *B*. The hypothalamus of the adult brain contains coördinating centers for patterns of response which are displayed during emotional excitement.

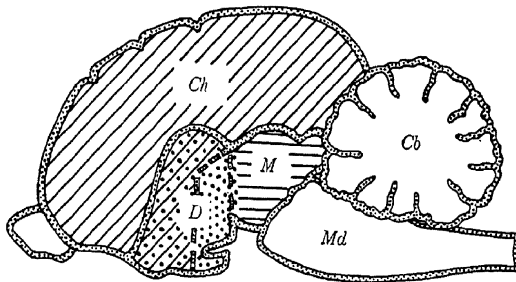


FIG. 20. DIAGRAM OF THE MIDSECTION OF THE CAT BRAIN (Modified from Cannon.)

The parts distinguished by slanting lines can be wholly removed without destroying the rage response. The figure shows the cerebral hemispheres (*Ch*), diencephalon (*D*), mesencephalon (*M*), cerebellum (*Cb*), and medulla (*Md*).

The anatomical location of the neural centers which coördinate emotional response patterns is indicated further in Fig. 20. This diagram is based upon the anatomy of the cat, an animal studied extensively by Cannon and others in researches upon emotion.

The location of the diencephalon is indicated by dots. As noted above, this region of the brain contains the hypothalamus. Many, if not all, of the patterns of response which appear during emotional excitement have their coordinating centers in the hypothalamus or in parts of the nervous system which are structurally and functionally at lower neural levels.

To illustrate what is meant by levels of the nervous system, observe the diagram in Fig. 21. In simple reflexes, the excitation of receptors

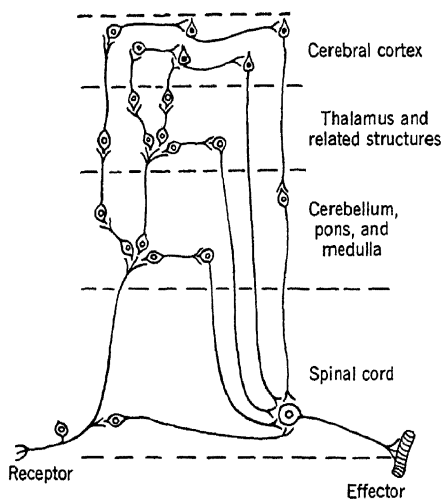


FIG. 21. A SCHEMATIC DIAGRAM TO SHOW ALTERNATE LOOPS AT DIFFERENT LEVELS OF THE CENTRAL NERVOUS SYSTEM. (Modified from Boring, Langfeld, and Weld, *Introduction to Psychology*, Revised Edition.)

produces a discharge across neural arcs to effectors. The coordinating centers for these reflexes are at the level of the spinal cord. The excitation of receptors, however, may produce a pattern of neural discharge which spreads to coordinating centers at the level of the medulla, pons, and cerebellum. This neural discharge may spread still further into the higher centers of the thalamic region, and finally into those of the cerebral cortex.

The neural organization which mobilizes the energies of an organism for a life-and-death struggle or for escape from danger or for the response patterns of startle, laughing, sex behavior, crying, etc., exists at the midbrain level.

According to the principle of Hughlings Jackson, the nervous system is organized in such a way that primitive reactions of the phylogenetically older (lower) parts are prevented from playing a dominant rôle in behavior by the inhibitory action of the younger (higher) centers. If this principle is correct, surgical removal of the cerebral cortex should weaken or destroy its inhibitory effect. There is some experimental evidence to show that decortication actually renders the animal *more* rather than *less* sensitive to stimulations which induce the rage pattern. For this pattern, at least, the neural centers which integrate the response respond readily when they are freed from the inhibitory effect of the cerebral cortex.

If we assume that the patterns of response which appear during emotional excitement are biologically ancient, we can picture emotion as a return to the primitive (subcortical) responses. This is a form of biological *regression*.

If one objects to interpreting the appearance of the midbrain patterns in terms of *regression* (on the ground that this term is already too confusing when used by psychiatrists, psychoanalysts, clinical psychologists, and others), one can still state the facts without implying any hypothesis of regression. It is true that during emotional excitement response patterns appear which are organized at the mid-brain level.

CONCLUSION

The theory that an emotion is a pattern of organic response has both advantages and disadvantages.

One advantage of the theory is that bodily patterns of response can be objectively observed and described. It is possible to determine what response patterns are present at birth, how these patterns change as the infant matures, and how they are modified through the process of learning. The account can be given in a straightforward, objective manner. Some of the questions which guide objective research upon patterns of organic response are these: What patterns exist? What are their component elements of response? Under what conditions are the patterns evoked? At what age do they mature? How are they changed through conditioning? What is the locus within the nervous system of the centers which coordinate a given response pattern?

Patterns of response are authentic data of science from an objective

point of view. Another advantage of the pattern-response theory of emotion is that it fits in well with the stimulus-response type of psychology. An emotional pattern, such as rage, can be described in terms of stimulus and response. In this respect it is similar to a simple reflex. Since the majority of psychologists and physiologists base their research upon the stimulus-response relationship, this point is an important one. In the field of physiology the pattern-response theory is of proved merit.

But there are several difficulties with this view of emotion. A major difficulty is that there is no criterion by means of which certain patterns can be identified as emotional and others as non-emotional. To illustrate this difficulty, let us assume that in the *emotional* patterns there is always some sign or mark of autonomic activity. On this basis the startle pattern and the Moro reflex are non-emotional; they must be regarded as general skeletal reflexes. On this basis, also, the reflexes of swallowing, urinating, defecating, coughing, sneezing, vomiting, and a host of others are often, if not usually, "emotional."

No psychologist or physiologist would want to use the term *emotion* to designate all these simple reflexive patterns. But how can emotional and non-emotional patterns be distinguished from each other?

Perhaps the best answer to this question is that there is no need to distinguish emotional from non-emotional patterns. Reflexive patterns of response are worthy of investigation for their own sake, wholly apart from the definition of emotion. Certainly no bias concerning the definition of emotion should be allowed to interfere with the objective investigation of the facts.

There is, however, another main difficulty with the definition of emotion as a pattern of response. The hypothesis implies that an emotion is an integrated, organized process. This implication is directly opposed to the view that an emotion is a state of disorganization or upset. To restrict the concept of emotion to patterns of response is to ignore the facts and problems which arise when emotion is defined as a state of disturbance or upset.

The patterns of response which are observed during emotional excitement should be studied not only for their own sake but also in relation to the total disturbed state of the organism. The total emotional event *includes* organic patterns of response.

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READING SUGGESTIONS

A vast amount of research has been carried out upon bodily changes during emotional excitement, such as variations in respiration, heart beat, blood pressure, variations in the electrical resistance of the body, and chemical and metabolic processes. Excellent summaries of this work can be readily obtained. For some of the special topics the student is referred to the following works:

Facial, vocal and other expressions of emotion. Lund (1939), Chap. 1, pp. 3-31, Identification of emotions. Ruckmick (1936), Chap. 9, pp. 232-275, The facial expression of emotion. Woodworth (1938), Chap. 11, pp. 242-256, Expression of the emotions.

Neuro-physiology of emotional processes. Lund (1939), Chaps. 2 and 3, pp. 32-82, The neuro-glandular basis of emotional reactions. Cannon (1929), Chap. 2, pp. 20-36, The general organization of the visceral nerves concerned in emotions.

Specific bodily processes in emotion. Lund (1939) Chaps. 4, 5, and 6, pp. 83-211; Chap. 4 is on cardiovascular and respiratory changes; Chap. 5, on gastrointestinal and sexual changes; Chap. 6, on metabolic and skin changes. Ruckmick (1936), Chap. 10, pp. 276-344, Other experimental procedures of expression. Woodworth (1938), Chap. 12, pp. 257-275, Bodily changes in emotion (on respiratory and circulatory changes, including studies of deception).

Galvanic skin response. Woodworth (1938), Chap. 13, pp. 276-297, The "psychogalvanic reflex" or "galvanic skin response." Ruckmick (1936), Chap. 11, pp. 345-372, The electrodermal response. See also Chap. 6 in Lund (1939).

General references for advanced students of emotion: Cannon (1929), Landis (1934), Bard (1934a), Dunbar (1935). Dunbar's work contains many references to research and to clinical material; it is written from the medical point of view. As a general statement of the modern tendency toward an organic theory of emotion see the excellent chapter by Beebe-Center in Gardiner, Metcalf and Beebe-Center (1937), Chap. 11, pp. 336-386. See also the review of experimental literature by Hunt (1941).

CHAPTER VII

FEELING AND EMOTION AS CONSCIOUS PROCESSES

In the days when Darwin (1872) wrote upon *The expression of emotions in man and animal*, the word *expression* implied that the true emotion was an inner consciousness which was revealed or "expressed" by physical signs. Although Darwin himself paid little attention to the strictly subjective aspect of emotion, his contemporaries pictured an emotion primarily as a conscious experience.

The "expressions," whether of an emotion or of a less disruptive feeling, are muscular movements and glandular secretions—objective facts of nature. The conscious experience which is "expressed," on the other hand, is purely a subjective datum.

Recognizing this distinction, psychologists have devised two kinds of method for the experimental study of feeling and emotion: the method of *impression* and the method of *expression*. Both methods imply the primary importance of the conscious experience.

The various forms of the *method of impression* all aim at getting a descriptive account of the conscious experience of the subject or of his evaluation of the objects presented during the experiment. Typically the subject is presented with perfumes, colored surfaces, geometrical designs, or other materials. Following the "impression" the subject makes a report, in the form of a preference judgment or an esthetic evaluation or of a direct report or description of the pleasantness which was felt. The form of the report varies with the aim of the experiment. The experimenter copies the subject's reports and later makes an analysis of them.

The many forms of the *method of expression* are designed to obtain graphic records of bodily changes in respiration, pulse, blood pressure, blood volume, sweat secretion, etc. These graphic records are measured and analyzed by the psychologist in the hope of discovering some relation between subjective experience and its outer "expression."

In the two preceding chapters the bodily changes of emotion were studied for their own sake and not as "expressions" of felt experience. In the present chapter felt experiences will be examined with little reference to physiological changes.¹

In the first part of the chapter we shall consider the affective processes—a broad group of experiences defined by reference to felt pleasantness and unpleasantness. In the second part of the chapter we shall examine several contemporary views concerning one kind of affective process—the conscious emotion.

THE AFFECTIVE PROCESSES

In traditional introspective psychology, *affection* (feeling) was distinguished from *cognition* (knowing) and *conation* (willing, desiring) and grouped with them as one of the three main aspects of "mind." Even today these distinctions are used in attempting to define such *felt* experiences as pleasantness and unpleasantness, on the one hand, and to distinguish them from purely cognitive meanings and from motivational processes, on the other.

The terms *affection* and *affective process*, in a narrow sense, refer to pleasantness and unpleasantness—consciously felt experiences. In a broader sense, these terms refer to a whole group of complex processes which are characterized as pleasing or displeasing to the subject.

Although the terms *affection* and *affective process* have definite subjective implications, the words appear in the literature as referring also to the objective aspects—behavioral and physiological phenomena—of pleasantness and unpleasantness. Primarily, however, it is subjective experience which gives *affection* its psychological connotation.

Varieties of the Affective Processes. The main varieties of the affective process are listed and briefly described below:

1. *Simple sensory feelings.* These are of two kinds: (a) *pleasantness*, induced by such sensory presentations as perfumes, sweet tastes, warm contacts, musical tones, colors, rhythmical movements, and (b) *unpleasantness*, aroused by such sensory presentations as foul

¹ The reason for this plan is that we regard felt experience and bodily changes as different aspects of a single natural event. The word *expression* implies a dualism.

odors, bitter tastes, cutaneous pain, rasping sounds, and dazzling lights.

Such feelings furnish a basis for esthetic appreciation. The musician revels in tone; the painter in his pigments; the epicure in his symphony of tastes and smells.

2. *Persistent organic experiences.* In this group are: (a) conscious *appetites* and *aversions*, and (b) various *comforts* and *discomforts*. Appetites are experienced as urges toward food, water, air, elimination, mate, sleep, activity. Aversions are experienced as impulses to avoid painful and dangerously threatening stimulations, such as hot stoves, electric shocks, putrid and foul-smelling foods. Organic comforts are the satisfactions and glows which may accompany food ingestion, sexual relief, and states of physical well-being. Organic discomforts are the aches and pains of indigestion, exhaustion, illness.

3. *Emotions* are acutely disturbed organic states which have their origin in the psychological situation (present or past) and which are indicated by marked bodily changes in the glands and smooth muscles. Emotional disturbances are designated by such words as: *rage, terror, horror, agony, great excitement, jealousy, shame, embarrassment, disgust, grief, joy.*

4. The term *mood* designates an affective process which is typically of longer duration and of less intensity than an emotion. A mood may last for hours, days, or even weeks. There are moods of cheerfulness, depression, anxiety, resentment, amusement, excitement, and the like. An emotion may taper off into a mood or a mood may build up into an emotion.

The bodily state predisposes an individual toward cheerfulness or depression, but it has been found that environmental factors are directly responsible for moods. To illustrate, a mother who has been wearing painfully tight-fitting shoes substitutes comfortable ones. She notices that she becomes more affectionate toward the children and feels more cheerful than before the change. More particularly it has been found¹ that moods depend upon events in the *social* environment, such as good news, anticipation of a dance, failure in an examination, loss of money.

5. The term *sentiment* is employed to designate affective processes which rest upon the training or past experience of an individual.

¹ By the writer (1937).

Sentiments are those affective reactions, toward an object or a related group of objects, which flow out of (or have their origin in) a complex of attitudes organized with reference to this object or group of objects.

Under this heading are the satisfaction and dissatisfaction with works of art, *e.g.*, musical compositions, paintings, poetry, architectural style. The patriotic thrill experienced when one's flag passes along the street on parade is a sentiment. There are sentiments of love which vary with the attitude of the lover. There are, in general, intellectual, moral, religious, esthetic, and other sentiments.

6. *Interests* are activities carried on repeatedly and consistently. The individual states that they are carried on for their own sake, which means that they are enjoyable, pleasing to him. An individual may be interested in baseball, swimming, collecting insects or stamps, reading detective stories. The term *aversion* is commonly used as an antonym to *interest*. One may be averse to the study of a foreign language, to keeping a social date, or to eating parsnips. If a man swims when he is plunged in the water by a capsized boat, we do not say he is interested in swimming. He is forced by circumstances to swim or drown, and he does not enjoy it. Further, he does not seek this kind of situation or its repetition. Although he may be a good swimmer, he is averse to the situation forced upon him. The term *aversion*, when so used, overlaps the meanings listed above under 1 and 2.

7. Finally, the term *temperament* refers to the persistent type of affective reaction made by a person. Temperaments are said to be apathetic, moody, phlegmatic, cheerful, vivacious, depressed, matter-of-fact, sanguine, etc. The term characterizes the affective aspect of the personality as a whole.

A fundamental contrast which can be traced through every one of these definitions is indicated by these pairs of words: pleasant-unpleasant, liking-disliking, interest-aversion, satisfaction-annoyance, delight-distress, comfort-discomfort. The contrast which these pairs of words imply is a fundamental one within affective psychology. It is this contrast which justifies us in grouping together such diverse psychological phenomena as the above under one general heading of *affective processes*.

Pleasantness and Unpleasantness as Conscious Experiences. What is the nature of experienced pleasantness and unpleasantness? This question has been raised from time to time. The history of psychology records a variety of answers. Each answer is relative to the postulates of a psychological system.

Today there are three main views regarding the nature of pleasant and unpleasant experience. These modern views are stated in the following.

1. According to one view, pleasantness and unpleasantness are *conscious meanings*—pleasantness, the meaning of acceptance, and unpleasantness, of rejection. In a critical review of current theories of affection, Hunt (1939) summarized this position as follows:

The organism may either accept or reject a stimulus. This acceptance or rejection is carried out through appropriate bodily adjustments. These reactions are said to constitute the affective response and are assumed to be a functional unity of some kind. [824]

The emphasis upon acceptance and rejection stresses the subject's attitude and behavior toward the *source* of feeling, rather than the *feeling* itself. This theory emphasizes the responses of liking and disliking which are made with respect to the inducing situations.

The *judgmental theory* of pleasantness and unpleasantness, as stated by Carr (1929) and elaborated by Peters (1935, 1937), presupposes the acceptance-rejection hypothesis. The theory assumes that if an individual normally makes a positive or maintaining reaction to an object, he labels it *pleasant*; if he normally makes a negative reaction, he calls it *unpleasant*. The terms *pleasant* and *unpleasant*, therefore, indicate that the situation arouses a response which belongs to one of these two general categories. To be pleased is equivalent to normal acceptance; to be displeased is equivalent to rejection.

This view has been stated by Fryer (1930). He believes that subjective and objective aspects of interest can be integrated in terms of a general organic theory of acceptance and rejection and in terms of the judgments which rest upon these responses. From the subjective standpoint, Fryer believes, acceptance is indicated by pleasant feeling and rejection by unpleasant feeling. From the objective standpoint, interests and aversions are reactions of acceptance-rejection.

2. According to a second view, pleasantness and unpleasantness are *palpable experiences akin to pressures of the cutaneous, kinesthetic, and organic senses*. This view has been expressed by Nafe (1934) in these words:

Pleasantness, as a psychological experience, consists of a pattern of discrete bright points of experience in the general nature of a thrill but usually much less intensive. It is vaguely localized about the upper part of the body. Unpleasantness is similar but characteristically duller, heavier, more of the pressure type of experience, and is localized toward the abdomen or the lower part of the body. [1076]

Historically considered, the bright-and-dull-pressure view is related to sensationism. If one seeks to observe pleasantness and unpleasantness, as such, one may arrive at the bright-and-dull-pressure hypothesis.

This view is primarily concerned with what feeling *is*, rather than with its relation to behavior and to personality development as a whole.

3. According to a third view, pleasantness and unpleasantness are pure *affective experiences* distinguishable from conscious meanings, on the one hand, and from sensory processes, on the other.

In contrast with the first view, the *affective-experience* hypothesis holds that feeling is different from cognitive meaning. If, to illustrate, an individual says, "I am pleased to meet you" or "I had a pleasant evening," these words communicate the meaning of pleasantness (cognition) but they do not imply genuine affective arousal. Felt pleasantness, by contrast, especially if it is very intense, is different from the coldly logical meaning.

In contrast with the second view, the *affective-experience* hypothesis holds that pleasantness and unpleasantness are non-sensory. And from this standpoint, it is illogical to identify pleasantness with (sensory) bright pressure and unpleasantness with (sensory) dull pressure. Instead, one must assume that these pressures are *associated with* pleasant and unpleasant feelings.

The affective experiences are similar to sensory processes in certain respects. Both manifest differences: (a) in quality, (b) in intensity, and (c) in duration or temporal course.

Critique of the above Views. Which of the foregoing views of pleasantness and unpleasantness is correct? In a brief note, Hunt (1933) pointed out that the verbal response "pleasantness" or "unpleasantness" may rest upon bright and dull pressure-like experiences, or these words may come to be used for non-sensory processes. Words, therefore, cannot solve the problem.

The correct answer is that each position depends upon certain postulates which constitute a logical point of view or way of looking at the facts. From one standpoint, pleasantness and unpleasantness are the conscious meanings of acceptance and rejection. From another standpoint, they are palpable experiences akin to pressures. From another standpoint, they are unique affective experiences distinguishable both from conscious meanings and from sensory experiences. It is all a matter of the way in which one looks at the facts; and there are several ways of viewing them which are psychologically significant. It is conceivable that each of the three views may be in part correct, each being correct from the standpoint of its own postulates.

Regardless of one's theoretical assumptions, there are certain statements of fact about pleasant and unpleasant feeling which have a general validity. It is important to realize that there are facts within affective psychology which can be accepted by all psychologists who approach the topic subjectively.

Some examples of the commonly accepted facts are listed below.

1. The basic distinction between pleasant and unpleasant feeling has been universally recognized. The contrast between these affective processes can be demonstrated with normal subjects by a series of sensory presentations. To demonstrate pleasantness present as a group: a lump of sugar, the odor of perfume, warmth when the subject is cold. To demonstrate unpleasantness present as a group: a strong solution of quinine on the tongue, the odor of dead fish, a burning pain. The contrast between these or similar groups of sensory presentations will demonstrate the basic difference between pleasant and unpleasant feelings.

2. It is widely recognized that pleasant and unpleasant feelings differ in degree or intensity. Persons in daily life distinguish between weak and intense pleasantness, between mild and strong unpleasant-

ness. Subjects in the psychological laboratory readily draw the same distinction.

3. Pleasant and unpleasant feelings are processes. They are events in the sense that each feeling has a beginning, a temporal course, and an ending. It is not always possible to say exactly when a feeling commenced; but if the feeling is intense, one can make at least an approximate report of its temporal course.

4. No single sense organ has exclusive control over pleasantness and unpleasantness. These feelings are aroused through cutaneous, kinesthetic, organic, olfactory, gustatory, auditory, and visual stimulations.

5. Regardless of the ultimate nature of pleasant and unpleasant feelings, the subject refers them to some object or situation which he regards as its source. Language is replete with examples of this. The usual formula is: "*X is unpleasant*"; "*The pleasantness is from or of Y.*"

6. Pleasant and unpleasant feelings enter into a wide variety of human experiences. They arise during esthetic enjoyment, during emotions of frustration or excitement or relief, during social situations which generate moods of cheerfulness and depression, along with appetitive and aversive states, along with simple sensory presentations, and with complex activities.

The analysis of affective processes is a basic problem within psychology. The present-day differences of theory present a challenge to the investigator.

The Relation of Pleasantness to Unpleasantness. We can represent the relation between pleasantness (*P*) and unpleasantness (*U*) by a straight line as in Fig. 22. There is an affective continuum with *P* at one end and *U* at the other. In the middle of the continuum is a range of affectively neutral or indifferent (*I*) experiences.

To illustrate the changes that take place in affective experience we will imagine a subject in a state of indifferent complacency. If such an individual is painfully stimulated or if tensions or cramps develop, an unpleasant feeling will arise. The more intense and persistent the irritants, pains, cramps, and tensions, and the more numerous, the greater will be the degree of unpleasantness. The departure from indifference to unpleasantness is indicated by an arrow, *a*, starting in

the range of indifference and pointing toward the extreme of intense unpleasantness. If the irritants, pains, cramps, and tensions are removed or relieved, the subject's affective experience changes from unpleasantness to indifference. This removal of unpleasantness,

through relief from its cause, is represented by a second arrow, *b*, which symbolizes the transition from *U* toward *I*.

There are positive forms of enjoyment. Perfumes, musical tones, colored lights, warm smooth contacts, free activities, interesting occupations, and the like, may produce great delight. The transition from affective neutrality to intense pleasantness is indicated by an arrow, *c*, starting in the range of indifference and pointing toward the extreme intensity of pleasantness.

From the standpoint of logic, as well as psychology, there is yet a fourth relationship: removal of pleasantness and return from positive enjoyment to indifference. After any highly pleasing experience, such as laughing at a very funny story, there is a gradual reduction of pleasantness

toward or into the range of indifference. The feeling at no time is unpleasant, but merely less and less intensely pleasant until normal indifference is resumed. Again, after a symphony concert or a dance or after any other enjoyable experience, the pleasantness gradually subsides and becomes indifference. This type of transition is represented schematically by an arrow, *d*.

The implication of the diagram is that *P* and *U* are psychologically opposed and incompatible processes. Experimental evidence supports this view. In an early experiment the writer (1918) attempted to evoke *P* and *U* simultaneously by combining stimulations, for example, by offering the subjects chocolate peppermint candies and at the same time presenting musical discords. The result of this work was negative. In more than 2000 trials *P* and *U* were not evoked simultaneously, and the conclusion was drawn that so-called "mixed feelings" do not exist. As *felt* experiences of definite intensity and duration (not as value judgments), pleasantness and unpleasantness are incompatible, antagonistic; they do not coexist.

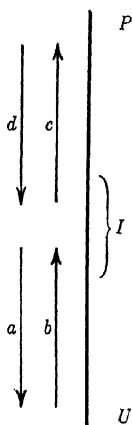


FIG. 22. REPRESENTATION OF CHANGES IN PLEASANTNESS AND UNPLEASANTNESS.

Another implication of the diagram is that indifference is a range rather than a point. There is no fixed point of indifference upon the affective continuum. Many experiences are so mildly pleasing or displeasing that one cannot report upon their affective quality. The line of distinction between indifference and pleasing or displeasing experiences cannot be sharply drawn. Again, an experience which is reported as indifferent may be reported as pleasing or displeasing with adaptation to conditions or through a shift of context.

Satisfaction and Annoyance. The terms *satisfaction* and *annoyance*, as employed by Thorndike, Hollingworth, and others, signify something more than mere pleasantness and unpleasantness. These words imply motivational principles suggested by the concepts of need, appetite, drive, frustration, consummatory response.

How are satisfaction and annoyance related to each other? Hollingworth (1931) states that there are three views of the relationship between satisfaction and annoyance. These views are: (1) Satisfaction and annoyance are on a par in human nature; they are independent and equally basic processes. (2) Satisfaction is the elementary fact of human nature. Pleasure-yielding trends are basic, and annoyance arises through the interference or blocking of these trends. (3) Annoyance is the primary fact of human motivation. Satisfaction is not an additional process but merely the removal of annoyance.

Hollingworth is inclined to accept the third of these views. He writes: "The stimuli to men's active endeavors are always irritants, itches, aches, pains, distresses, cramps and tensions—the so-called 'disagreeables.' They are the prime movers to action. . . . The satisfaction of a motive is merely its removal."

According to this view, satisfaction is always a form of relief. The view may be criticized by pointing out that there are *positive* forms of enjoyment as well as bare relief. Wholly apart from relief, the individual *enjoys* certain unsought sensory stimulations when and where they occur—perfumes, sweet tastes, musical tones. Further, various activities are interesting, *i.e.*, pleasing—dancing, playing a game, carrying on a conversation with a friend. Such activities yield positive enjoyment that is more than relief.

Satisfaction, in fact, is of two forms: (1) *relief* from various pains, tensions, strains, irritants, etc., and (2) *enjoyment* of countless sensory

stimulations, activities (interests), esthetic experiences, etc. *Relief* is passive satisfaction and *enjoyment* is a pleasant experience in which the individual is more active.

The Objective Signs and the Determining Conditions of Pleasantness and Unpleasantness. In the report of an experiment which dealt with training the preschool child to like or dislike tastes, Gauger (1929) listed the following observable characteristics of satisfaction and dissatisfaction:

<i>Satisfaction</i>	<i>Dissatisfaction</i>
Chewing, smacking the lips.	Making a wry face, frowning.
Licking the lips.	Trying to spit out the stimulus-object.
Smiling.	Tears in the eyes.
Lighting up of the eyes.	Speaking ("I don't like that").
Reaching for a stimulus-object.	Coughing, gagging.
Swinging the feet.	Vomiting.
Moving the head.	Turning away the head.
Waving the hands.	Pushing away the stimulus-object.
Sticking out the tongue.	Not attending.
Speaking ("That's good").	Retaining the stimulus-object as short a time as possible.
Retaining the stimulus-object in the mouth as long as possible.	Facial expression (looking "hurt," as if blaming the experimenter for a bad taste).

The lists are not entirely satisfactory. Some of the characteristics fail to distinguish satisfaction from dissatisfaction. For example, swinging the feet, moving the head, and waving the hands may occur in satisfaction, indifferent activity, or dissatisfaction. The lists, however, raise the important problem of determining the objective signs of satisfaction and dissatisfaction, of pleasantness and unpleasantness.¹

A good many experiments have been performed in the hope of finding some objective *conditio sine qua non* of felt pleasantness and unpleasantness. As a matter of fact, there is simply no known objective criterion of pleasantness and unpleasantness which is valid in 100 per cent of the cases. Some of the more probable associations are these:

¹ On page 167 we suggested that the smile and laugh be used as objective criteria of *delight* and that the cry and frown be used as criteria of *distress* in infants. These response patterns can be studied objectively without any reference to the subjective experiences of the infants.

<i>Pleasantness Is Associated With:</i>	<i>Unpleasantness Is Associated With:</i>
Vasodilation.	Vasoconstriction.
Muscular relaxation.	Muscular strain and tension.
Release of central tension.	Central tension.
Making a goal response.	Frustration and conflict.
Certain stimulations, <i>e.g.</i> , those producing warmth, low weak tones, and the taste of sweet.	Certain stimulations, <i>e.g.</i> , those producing loud tones, and pain.

It is for psychology of the future to demonstrate an objective correlate of felt pleasantness and unpleasantness which admits of no exception.

In view of the facts, perhaps the best one can do today is to accept the subjective feelings of pleasantness and unpleasantness as primary data of individual experience which are related, indeed, to a variety of behavioral, physiological, and conscious processes, but which stand alone as independent psychological facts.

If we drop the quest for an objective *conditio sine qua non* of pleasantness and unpleasantness, we can summarize the various conditions which generate these feelings. A summary would run something like this:

Pleasant experience tends to occur when a desire is satisfied, when tension is released in such a way that the level of self-esteem is elevated, when sexual inhibitions are removed, or when some other motive is satisfied. If thirsty, a little water to drink is pleasing; if overheated, a cool breeze is pleasing; if the sexual appetite is aroused and intense, its satisfaction is pleasing. Play and sports which bring the companionship of others, the opportunity to converse and to listen, to display one's skills and gain recognition, bring pleasantness. In general, the satisfaction of a motive brings pleasant feeling.

Unpleasant experience, in contrast, tends to occur when a desire is frustrated, when tension is built up, when the level of self-esteem is lowered, when any appetite remains painfully intense and unsatisfied, when the tissues are being injured and the pain nerves excited, when one is prevented from doing or possessing what one wants to do or to possess. In a word, frustration, conflict, tension, pain, and injury tend to arouse unpleasant feeling.

Indifference exists when the conditions for evoking pleasantness and unpleasantness are absent.

The Relation between Affective Processes and Pursuit-avoidance. The statement is sometimes made that pleasantness is associated with movements of pursuit (seeking, maintaining, positive, accepting, adient activity), and that unpleasantness is associated with avoidance (escape, negative, rejecting, abient behavior). A brief consideration, however, reveals that the relation between the affective processes and the activities of pursuit and avoidance is not a simple one.

During the earliest period of infancy there is little evidence that avoidance is the immediate correlate of unpleasantness. When an infant is strongly stimulated, he responds by wriggling, kicking, crying, and perhaps screaming. If pricked by sharp points, or irritated by wet clothing, or stimulated by hunger or colic, there is an increased level of emotional excitement. But, as we say, the infant has not learned how to avoid the source of distress. When the source of distress is removed, there is a quiescence, a lowering of the level of general activity. We do not know, of course, what and how the infant *feels* when he exhibits such behavior; but it is reasonable to assume that he is displeased when kicking, crying, screaming, and that he is relieved or pleased when complacency is restored by removal of the painful points or other sources of distress.

When the infant is socially stimulated by the smiles and playful vocalizations of an adult, he may smile or laugh. This form of behavior, we assume, expresses pleasant feeling. The smile or laugh, however, is better described as a form of muscular relaxation than as active pursuit.

Under what conditions does pursuit-behavior arise? The overt seeking of food, water, air, mate, money, or social approval is usually an indication of some irritant or need. Subjectively considered, this irritant or need is a source of unpleasantness. Pursuit is typically associated with conditions which evoke unpleasantness. For example, if a man is very thirsty, he will seek water; his water-seeking indicates an unpleasant feeling. The locating and drinking of water bring relief of his thirst, which satisfaction, to be sure, is pleasing; but the seeking of relief is not pleasing.

Clearly, then, we cannot claim that activities of pursuit indicate pleasantness, and activities of avoidance, unpleasantness. The picture is too complicated for any such simple relationship to be regarded as

universally valid. We come closer to the truth if we claim that unpleasantness is associated with painful stimulation, frustration, and conflict; and that pleasantness is associated with relief from these conditions.

Affective Ratings upon Sensory Presentations, Activities, and Words. We all know that the child likes candy and dislikes castor oil, but we may not know that ratings in terms of pleasantness and unpleasantness reveal marked uniformities within a group of subjects. Such uniformities appear, however, when affective ratings are treated by statistical methods.

A few illustrations of the uniformity of affective ratings will be drawn from a recent study by Singer and the writer (1941). In this experiment a group of thirty-nine subjects individually made affective ratings upon odors, tastes, tones, words and phrases, activities, and moods. The ratings were made by means of a special rating scale, extending from the extreme of pleasantness through indifference to the extreme of unpleasantness.

In the total experiment more than 54,000 separate affective ratings were obtained. To simplify handling of the data the ratings were grouped as pleasant (*P*), intermediate (*I*), and unpleasant (*U*). For some purposes a percentage of *pleasant* ratings was computed (the intermediate ratings then counting as one-half *P* and one-half *U*).

To illustrate the uniformities which were found, some of the data for tastes, tones, activities, and verbal material are presented.

Tastes. About one cubic centimeter of taste solution was placed upon the tongue of the subject by means of a medicine dropper. Immediately after tasting the liquid, the subject, using a printed scale and form, made an affective rating.

Figure 23 presents some of the results graphically. The percentage concentration of sugar (sucrose) solution is shown along the horizontal line. Distilled water (zero per cent) was employed as a control solution. The vertical line of the figure indicates the number of ratings of *P*, *I*, or *U*. Since there were thirty-nine subjects in the experiment the total number of *P*, *I*, and *U* ratings at each concentration is equal to thirty-nine. To avoid confusion, the *U* ratings are plotted below the horizontal line.

This figure indicates clearly that, as the concentration of sugar

increases, the frequency of the rating of pleasantness also increases. The gain is made possible by a decline in the frequency of intermediate ratings. The number of ratings of unpleasantness is low at all concentrations.

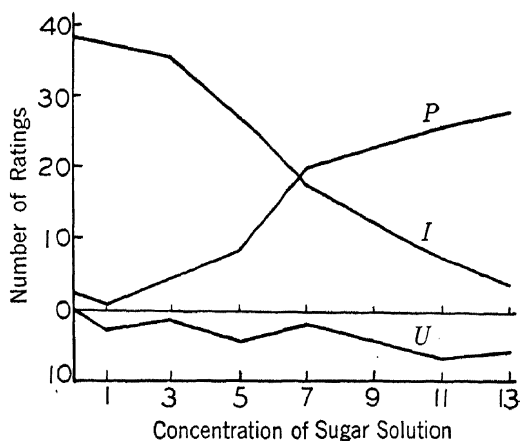


FIG. 23. FREQUENCY OF AFFECTIVE RATINGS FOR DIFFERENT CONCENTRATIONS OF SUGAR SOLUTION. (From Singer and Young.)

Figure 24 presents the ratings of salt solutions. Ten concentrations were employed in the experiment. The curve shows that the higher the concentration of salt the more frequently is the *U* rating made by the group. Increase in the frequency of *U* ratings (plotted below the base line) is made possible by a decrease in the frequency of *I* ratings. The frequency of *P* ratings is low at all concentrations.

The contrast between the ratings of salt solutions and those of sugar is very marked. At moderate concentrations salt solutions are characteristically rated as unpleasant and sugar as pleasant. The curves show the quantitative relation between concentration of solution and the affective ratings.

Tones. We know, in general, that musical tones are pleasing to most persons and that shrill, harsh sounds are displeasing. Musical tones are complex.

Relatively pure tones were produced in the laboratory by means of a beat-frequency oscillator and a dynamic speaker. The tones ranged

in frequency from 100 to 4000 cycles per second. The tone for each frequency was presented at six or eight levels of loudness. Each tone was presented to the group for a few seconds and, immediately after the tone ceased, the affective rating was made.

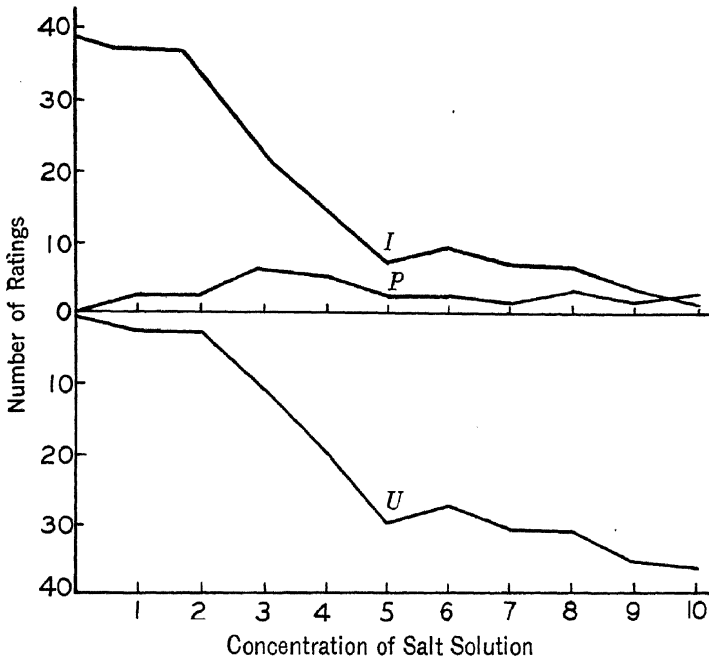


FIG. 24. FREQUENCY OF AFFECTIVE RATINGS FOR DIFFERENT CONCENTRATIONS OF SALT SOLUTIONS. (From Singer and Young.)

In working up the results a percentage of *pleasantness* ratings was computed for each tone. The following tabulation presents these percentages for six representative frequencies at three levels of loudness.

FREQUENCY (Cycles per second)	LOUDNESS		
	Faint	Medium	Loud
100	75	74	58
200	76	65	36
400	73	45	3
800	63	36	2
1600	49	35	6
3200	38	19	2

If the percentages for each frequency are read from left to right, it will be seen that the louder the tone the lower the percentage of ratings of pleasantness. Again, if each of the three columns of percentages is read from top to bottom, it will be noted that there is a steady decline. In general, this means that high, loud tones are rated as unpleasant and that low, faint tones are rated as pleasant.

The tones were relatively pure. If tones from musical instruments or from some other source had been used, different results might have been found.

Activities. In one series of the experiment, the subjects were instructed to carry out certain specific activities. Some of these were interesting and others were monotonous, boring; some were simple, others complex. During the course of the experimental activity, three affective ratings were required at intervals of three minutes.

Examples of pleasing activities are:

(a) Manipulating a toy construction set so as to produce certain articles to be shown to the experimenter for evaluation.

(b) Using clay and scalpel to model a horse and to show the same to the experimenter for evaluation.

Examples of displeasing activities are:

(c) Carefully and neatly replacing pins in their holes in the pin paper, showing the result to the experimenter.

(d) Obtaining as many reversals of perspective as possible with the stair-case figure, and making a tally whenever the perspective reverses.

The average percentage of pleasantness for the group is shown below:

ACTIVITY	RATINGS		
	<i>First</i>	<i>Second</i>	<i>Third</i>
(a)	90	91	92
(b)	90	87	90
(c)	42	41	46
(d)	46	40	41

The sample shows the high degree of consistency from rating to rating, and the contrast between pleasing (*a* and *b*) and displeasing (*c* and *d*) activities.

A number of factors determine the rating of an activity as pleasing or displeasing. Some of these factors are monotony, novelty, congruity with an interest or skill, opportunity to display one's work for appraisal, and so on. The complexity of the activity may be a factor determining the rating, but the subjects were able to rate simple and complex activities with equal ease and consistency.

Verbal Material. During the experiment lists of words and phrases were read, one at a time, and rated affectively.

A few examples of items which were rated between 90 and 100 per cent pleasant are these: *reading newspaper comics; dancing; singing; musical comedy; playing baseball.* Examples of items which were rated between 0 and 10 per cent pleasant, i.e., the most unpleasant items, are these: *people who chew loudly; self-conscious people; street beggars; being confined in a hospital; quick-tempered people; affected people; girls who are gold-diggers.*

It is obvious from these examples that it is the thing symbolized by the word or phrase which serves as the basis of the rating. The words definitely suggest activities, experiences, characteristics of people, and situations which are pleasing or displeasing.

For every kind of presentation two or more successive ratings were made by the subjects. The coefficients of correlation between successive ratings were positive, varying from 0.37 to 0.95. All things considered, there can be little doubt that affective ratings are uniform and consistent.

The Specific Nature of Affective Ratings. From the results of the experiment described in the foregoing section it is possible to determine whether a person who is readily pleased by tastes is also readily pleased by tones, by odors, by activities, and by verbal material. If individuals differ in their general *readiness-to-be-pleased*, these differences should be demonstrable from the data.

Concretely, a Pollyanna temperament might conceivably tend to rate odors, tastes, tones, activities, words, and other materials, toward the pleasant end of the affective rating scale. A chronic pessimist, by contrast, might tend to make evaluations in terms of unpleasantness. That is to say, an individual possessing to a high degree the trait of *readiness-to-be-pleased* would tend to rate his moods as

cheerful and to find activities interesting, more than a person possessing this alleged trait to a low degree.

In the experiment under consideration, the *same* presentations were rated affectively on two occasions. We noted above that the coefficients of correlation between the two sets of ratings were positive and significantly high. But the critical test, so far as the existence of a general trait of *readiness-to-be-pleased* is concerned, is that of correlating affective ratings of *different* kinds of stimulus-situation such as the odor of camphor and a tone of 1000 cycles.

If there is a general affective trait, positive and significantly high coefficients should be obtained when different presentations are made. If, in an actual test, the coefficients are found to be low, this can only mean that the evidence is against the existence of a general trait of *readiness-to-be-pleased*.

Actually, all the coefficients of correlation were found to be exceedingly low; some were positive and some negative. All things considered, no evidence was discovered for the existence of a general affective trait.

The interpretation of this result is that affective ratings, to an exceedingly high degree, are specific in the sense that each presentation brings forth its own particular affective rating. If John Jones rates the odor of camphor as "very pleasant," from this fact no prediction can be made as to how he will rate the odor of geraniol, or the taste of distilled water, or a particular tone of 1000 cycles, or a verbal phrase, or an activity. Each affective evaluation stands alone as a unitary fact.

A similar conclusion was reached independently, through another technique, by Wechsler (1925) and Wechsler and Jones (1928) who concluded that, "Individuals tend to react in a specific rather than in a general way to emotional situations."

Our explanation of the general result is the following. The affective ratings were determined by the physical organization of the individual. This organization is not motivating in the sense that it leads the individual to initiate any overt activity. It is a passive structural organization, which preserves countless possibilities of affective reaction.

A crude analogy may clear the point. The writer recently saw an inclined board with a lot of pegs upon it. A marble, made to roll

down the incline, bounced from peg to peg until finally it came out at the bottom. The path of the marble depended, of course, upon the arrangement of the pegs and upon the place from which the ball was started. It depended upon the size and shape of the ball and upon other factors.

In a similar way the organized structure of an individual at any time determines the nature of the response he makes to a given stimulation. Just as the path of the marble depends upon the kind of marble which is released, the place at which it starts its course, the slope of the board, and especially upon the arrangement of the pegs on the incline, so the individual's affective responses depend upon the kind of stimulation, the circumstances under which the stimulation occurs, and the specific bit of neural organization which happens to be excited by the stimulating circumstances.

The high degree of specificity found in affective ratings can mean only that there is no general affective factor, no all-pervasive *readiness-to-be-pleased* or *readiness-to-be-displeased*. How this finding relates to the general and group factors of esthetic judgments we do not know.¹ Whether or not the conclusion applies to the total personality and to social situations is a question which will have to be left open, for the study was made largely with non-social presentations.

Some individuals appear to be always happy, but perhaps this

¹ Since the completion of this manuscript, Professor Langfeld has called attention to papers by Eysenck (1940, 1941a, 1941b) reporting the discovery of a general T-factor (factor of taste) in esthetic judgment. Eysenck also found a bipolar factor which divides people into groups, e.g., those preferring simple figures and those preferring complex figures.

A consideration of Eysenck's procedure may clear up the apparent discrepancy between his and our results. Eysenck required his subjects to rank pictures, polygons and odors in order of merit. He then worked out coefficients of correlation from the preferential orders, and by making a factor analysis of the coefficients he discovered the general and bipolar factors. Our method, however, singled out in advance the simple hedonic continuum of pleasantness-unpleasantness in a scale for rating. Our method starts from ratings which may be based directly upon the affective processes, whereas Eysenck's method necessitates judgment and evaluation. Eysenck's subjects were only required to make a relative preference judgment of complex objects, without attempting to rate each object on the basis of any single psychological attribute, however much such an attribute as size, brightness, hue, or pleasantness-unpleasantness might have influenced or determined that preference.

After reviewing the studies of Eysenck and other English psychologists, Peters (1942) comments that they all have made the stimulus error. "Stimulus characteristics, such as form, representativeness, classical, romantic, simple, complex, were treated as if they were variables of the physical stimulus with existence independent of any reacting subject." Close attention, therefore, should be given to the possibility of a stimulus error in any attempt to reconcile our result with that of Eysenck and others.

persistent wearing of a smile is a social pose rather than the mark of a genuine temperamental trait. The individual may enact the rôle of good fellow well met or all-around pleasing individual. Common speech contains the phrase "a pleasing personality." Such a person is regarded as optimistic and cheerful in his outlook upon life. The "pleasing person" laughs readily (even at poor jokes!), smiles when meeting acquaintances, finds his coffee delightful, believes in a happy future, that God's in His heaven and all's right with the world. The "pleasing person" makes others happy by his smiles, his remarks and conduct.

Psychologists, accepting the common belief in a cheerful and gloomy trait of temperament, have regarded cheerfulness and gloominess as fundamental in the personality as a whole. The negative findings of Singer and Young, limited to simple sensory presentations, activities, verbal material, and moods, make it urgent to establish on a factual basis, if possible, the existence of the commonly accepted temperamental traits of cheerfulness and depression, and to define them exactly.

Attitudes of Liking and Disliking Persons. What makes us like certain persons and dislike others? What characteristics of an individual (traits of personality, actions, attitudes) induce positive attitudes and what negative? Are there any differences between men and women in the factors which determine their attitudes of liking and disliking persons? These and similar questions were studied for college students by Thomas and Young (1938).

The subjects were 676 students in the elementary psychology course at the University of Illinois. Each student was given a printed form which instructed him to list the initials of a few persons who were the *most liked*, and, in another column, the initials of a few who were the *most disliked*. The sex of each person was indicated on the blank. Then the individuals were ranked in an order of preference by a method which provided for the equal ranking of two or more persons.

A statistical analysis of the results showed that, on the average, 2.7 times as many names were listed in the column headed *like* as in the column headed *dislike*. This was true for judges of both sexes. Also, the persons whose initials were listed tended to be of the same sex as

the student who did the listing—a fact which probably indicates that one's acquaintances tend to be of the same sex as one's self.

The person who was ranked as the *most highly liked*, however, was usually a person of the opposite sex. This fact is not surprising for college students in the mating years! Again, the order in which the names were listed tended to agree with the order of ranking which was subsequently made. This indicates that we tend to think first of the most liked person in listing the persons liked, and of the most disliked, in listing the persons disliked.

On the second page of the printed form the students were instructed to give the reasons for liking and disliking the persons already listed. Special interest attaches to the reasons given. The alleged reasons for liking and disliking persons were tabulated and the frequency with which each was mentioned was determined.

All told, seventy-four different "reasons" for liking people and sixty-six reasons for disliking, were listed. The first fifteen of the "reasons" for liking and disliking persons of the same and opposite sex are presented in Tables 7 and 8. The tables speak for themselves and need no further comment.

TABLE 7
ALLEGED REASONS FOR LIKING AND DISLIKING PERSONS

Why women like:				Why women dislike:			
WOMEN		MEN		WOMEN		MEN	
<i>Trait</i>	<i>N</i>	<i>Trait</i>	<i>N</i>	<i>Trait</i>	<i>N</i>	<i>Trait</i>	<i>N</i>
intelligent	134	intelligent	154	conceited	111	conceited	122
cheerful	123	considerate	102	deceitful	73	selfish	33
helpful	103	kind	79	selfish	70	unmannerly	30
loyal	101	cheerful	70	loud	43	overbearing	27
generous	94	mannerly	70	self-centered	40	deceitful	24
sweet	84	conversational	62	snobbish	40	uninteresting	22
entertaining	84	handsome	61	affected	32	unintelligent	21
kind	82	sense of humor	61	unmannerly	32	self-centered	19
good sport	79	congenial	55	overbearing	31	untruthful	19
common interests	77	interesting	54	inconsiderate	28	boastful	16
congenial	77	common interest	53	meddlesome	26	dishonest	16
sense of humor	73	entertaining	50	unintelligent	24	ill-tempered	12
considerate	72	generous	46	insincere	23	unfair	12
understanding	65	friendly	45	silly	20	weak	12
friendly	63	good sport	44	jealous	19	bold	11

TABLE 8

ALLEGED REASONS FOR LIKING AND DISLIKING PERSONS

Why men like:				Why men dislike:			
MEN		WOMEN		MEN		WOMEN	
Trait	N	Trait	N	Trait	N	Trait	N
intelligent	130	beautiful	129	conceited	170	conceited	48
cheerful	101	intelligent	90	self-centered	48	gossips	31
friendly	91	cheerful	56	unintelligent	46	snobbish	25
common interests	90	congenial	55	deceitful	42	deceitful	21
congenial	87	sex-appeal	53	overbearing	37	unintelligent	20
helpful	83	friendly	46	dishonest	37	loud	16
loyal	78	kind	46	selfish	35	selfish	16
sense of humor	70	good sport	41	loud	33	affected	14
generous	64	helpful	33	snobbish	32	silly	14
good sport	50	considerate	29	unmannerly	32	talkative	14
honest	46	understanding	28	boastful	29	overbearing	12
kind	43	conversational	26	personal injury	26	dishonest	9
considerate	39	common interests	25	untruthful	24	inconsiderate	9
sincere	35	companionable	24	ill-tempered	21	hypocritical	7
idealistic	32	sense of humor	23	officious	21	ill-tempered	7

Concluding Statement about the Affective Processes. The discussion of the affective processes in the foregoing pages has shown that conscious feelings and evaluations are dependent upon the attitudes of the subject. But pleasantness and unpleasantness are not themselves to be identified with attitudes. They are the subjective experiences of an individual.

Objectively considered, the affective processes are revealed in the behavior and physiological changes of the subject. At the present time, however, no one-to-one correlation has been discovered between felt pleasantness or unpleasantness, on the one hand, and physical changes, on the other. It is for psychology of the future to discover an objective *conditio sine qua non* of felt pleasantness and unpleasantness.

In the meantime there are many positive lines of research upon the affective processes which have proved to be fruitful of results. Only a few of these have been examined in the above discussion.¹

We turn now from a consideration of the affective processes in general to a specific kind of affective process—the conscious emotion.

¹ For further details the reader is referred to Beebe-Center (1932).

THE NATURE OF CONSCIOUS EMOTION

To the layman, feelings and emotions are primarily *conscious* experiences. *Feeling* is the broader term, including emotion. Thus the layman speaks of *feelings* of hunger, sleepiness, fatigue, pain, satisfaction, annoyance, pleasantness and unpleasantness, and of *sentiments* such as loyalty or pride. These "feelings" usually are not sufficiently intense or disturbing enough to be classified by the psychologist as *emotions*.

Emotions are distinguished from simple sensory feelings of pleasantness and unpleasantness, from appetites and aversions, comforts and discomforts, moods, sentiments, and interests mainly by the factor of acute upset which arises from a predicament.

In the following pages we will consider some of the main accounts of emotional experience. The different views presented can be brought to a focus by the question, *What is the nature of the conscious emotion?*

Each view will be presented as a single aspect of the total conscious event. But the separate accounts can be fitted together to make a total picture, much as the parts of a jig-saw puzzle can be fitted together in relation to each other.

Emotion as the Awareness of Bodily Changes. In his classic chapter upon the emotions, William James (1913) pointed out that profound bodily changes occur during emotional excitement. He quoted a Danish physiologist, C. Lange, to show that in grief, for example, there are such manifestations as the following: paralysis of voluntary movement, movement which is slow and heavy and without strength, a weak voice, neck bent with head hanging or "bowed down," eyes large in appearance, bloodlessness of the skin, mouth dry, and in nursing women diminishing of the milk. James quoted Darwin to present some of the organic symptoms of fear: eyes and mouth wide open, posture motionless or breathless, heart beating violently, paleness of the surface, cold sweat, hairs erect, breathing hurried, trembling of the muscles, mouth dry, arms protruded as if to avert some danger, and so on. During hatred, according to a quotation from Mantegazza, there are such bodily changes as these: withdrawal of the trunk, contraction or closure of the eyes, frowning, display of the teeth and contracting jaws, deep inspirations, auto-

matic repetition of one word or syllable, redness or pallor of the face, dilation of the nostrils, standing up of the hair on the head, and so on.

If we go through the whole list of emotions and examine their organic manifestations, we but "ring the changes on the elements which these three typical cases involve." James was somewhat pessimistic about bringing law and order out of the mass of descriptive details in the literature of emotion. Nevertheless, he went on to a statement of his theory in a paragraph which, perhaps, has been more widely quoted and discussed than any other paragraph in the contemporary literature of emotion:

Our natural way of thinking about these coarser emotions is that the mental perception of some fact excites the mental affection called the emotion, and that this latter state of mind gives rise to the bodily expression. My theory, on the contrary, is that *the bodily changes follow directly the perception of the exciting fact, and that our feeling of the same changes as they occur IS the emotion*. Common-sense says, we lose our fortune, are sorry and weep; we meet a bear, are frightened and run; we are insulted by a rival, are angry and strike. The hypothesis here to be defended says that this order of sequence is incorrect, that the one mental state is not immediately induced by the other, that the bodily manifestations must first be interposed between, and that the more rational statement is that we feel sorry because we cry, angry because we strike, afraid because we tremble, and not that we cry, strike, or tremble, because we are sorry, angry, or fearful, as the case may be. Without the bodily states following on the perception, the latter would be purely cognitive in form, pale, colorless, destitute of emotional warmth. We might then see the bear, and judge it best to run, receive the insult and deem it right to strike, but we should not actually *feel* afraid or angry. [449-450]

James proceeds to argue for his theory. First, he points out, no one can doubt that psychological objects and situations do excite bodily changes through a preorganized mechanism and that in emotion these reverberations extend throughout the entire organism. Second, every one of these bodily changes is *felt*, acutely or obscurely, the moment it occurs. Third, if we fancy some strong emotion, and try to abstract from it the consciousness of its bodily symptoms, there is nothing left behind. "What kind of an emotion of fear would be left if the feeling neither of quickened heart-beats nor of shallow breathing, neither of trembling lips nor of weakened limbs, neither of goose-flesh nor of visceral stirrings, were present, it is quite impossible for me to think. Can one fancy the state of rage and picture no ebullition in the chest,

no flushing of the face, no dilatation of the nostrils, no clenching of the teeth, no impulse to vigorous action, but in their stead limp muscles, calm breathing, and a placid face? The present writer, for one, certainly cannot. . . ."

For James the essential point is that an emotion is an awareness of bodily changes as they occur. There is a situation which arouses bodily changes reflexively. The awareness of these changes constitutes the conscious emotion.

Various criticisms have been directed against James' theory but these need not be reviewed here. Briefly, it has been demonstrated that when an individual cannot possibly feel the bodily changes of emotion, owing to a lesion in the nervous system, he may still act in an emotional manner. It has been shown, further, that dogs and cats respond emotionally after ablation of the cerebral cortex (presumed to be necessary for consciousness).

The essential positive point to the theory, as noted above, is the emphasis upon awareness of the bodily changes of emotion as constituting the subjective experience.

Emotion as an Affective Experience. Another emphasis has been given by Titchener (1924). He characterized the emotional experience as follows. It is a temporal process, a course of consciousness. It is suddenly initiated, arising abruptly and then quieting down. It is a highly complex consciousness, occurring in a total situation or predicament. It is an affective consciousness, being markedly pleasant or unpleasant. It is an insistently organic consciousness. Finally, it is a predetermined consciousness, proceeding to a natural terminus.

Titchener's description of the emotional experience is a comprehensive one; but if Titchener's account be contrasted with that of James, the distinctive feature in Titchener's discussion is seen to be an emphasis upon the *affective* nature of emotion. For Titchener an emotion is a pleasing or displeasing experience as well as an insistently organic consciousness arising out of a predicament.

This emphasis upon the *affective* nature of emotion is by no means incompatible with an emphasis upon organic sensation. The views of Titchener and James (so far as they are purely descriptive of the emotional consciousness) can be regarded as supplementary rather than as opposed.

“Emotion” as the Conscious Aspect of Instinctive Activity.

Another aspect of the total emotional experience has been stressed by McDougall (1926). Here, again, McDougall's view need not be regarded as opposed to the views of James and Titchener. His account is a supplementary one which stresses another phase of the total emotional process.

According to McDougall, an “emotion” is the conscious aspect of an instinctive activity. An “emotion” is an experience consciously felt by the individual while an innate impulse is dominating his behavior.

There are primary “emotions” correlated with the basic instincts. A list of seven principal instincts of man and their parallel conscious “emotions” is given below:

<i>Instinctive Behavior</i>	<i>Experienced “Emotion”</i>
Flight	Fear
Repulsion	Disgust
Curiosity	Wonder
Pugnacity	Anger
Self-abasement	Subjection
Self-assertion	Elation
Parental behavior	Tender emotion

In addition to these instinctive activities there are several other instincts which have a less well-defined emotional aspect. In earlier editions of his *Social Psychology*, McDougall listed the following as examples of instincts which lack a well-defined emotional tendency: reproduction, sexual jealousy, female coyness, the gregarious instinct, acquisition, and construction. Later he pointed out that the emotion of lust is the conscious correlate of the sexual instinct. If *lust* is added to the above list, the number of primary human “emotions” is increased from seven to eight.¹

Lust is different from tender emotion although the two are frequently linked together. Lust is equivalent to sexual desire—an aspect of the appetitive state which normally leads to sexual intercourse. Tender emotion is felt by the mother who protects and cherishes her young, and by the individual who cares for a pet. Even a blood-

¹ It is unfortunate that Ruch (1941) substituted the term *lust* for *love* in discussing Watson's three basic emotional patterns (fear, rage, love), because *lust* properly designates sexual desire or appetite rather than emotion. Watson's original use of the term *love* was objectionable as a designation of the primitive pleasurable responses of infants. Bridges' term *delight* would have been more appropriate.

thirsty head-hunter of Borneo, McDougall observed, tenderly nurses his infant in arms while spending a day at home. Some savages kill their infants as soon as they are born; but if an infant is allowed to survive a few days, its life is safe. By that time, according to McDougall, a sentiment of parental love is formed which is too strong to be overcome by prudential or selfish considerations.

Sentiments are acquired dispositions which predispose the individual to a particular form of affective response. According to Shand (1920) and to McDougall, one's emotional dispositions become organized into systems about the various objects and classes of objects that excite them. Such an organized disposition within the individual is defined as a "sentiment." (We would prefer some other term, such as *attitude* or *motive*.)

In building up a "sentiment" two or more of the primary instincts may fuse and their corresponding conscious "emotions" likewise fuse. For example, admiration is a "sentiment" produced by the fusion of two primary instincts: curiosity and self-abasement. The corresponding "emotions" of wonder and subjection (negative self-feeling) are also fused to form the secondary emotion of admiration. If admiration is blended with fear, the resulting experience is an "emotion" of *awe*.

Following this pattern of analysis both Shand and McDougall have analyzed a variety of complex emotional experiences into their elements.

Their work stresses the basic importance of the conscious feelings which accompany such activities as flight, repulsion, exploration, fighting, humbling one's self or asserting one's self, protecting the young, making an amorous advance. The subject is clearly aware of these well-integrated activities, and his conscious feeling constitutes the emotion. For McDougall, then, a primary emotion is the consciously felt aspect of a well-organized, instinctive activity.

Emotion as a Conscious Blur or Confusion. Throughout the foregoing section it was necessary to put the word *emotion* in quotation marks because McDougall's definition is incompatible with the view of this text. McDougall's interpretation emphasizes the organized, integrated aspect of emotional behavior and emotional experience.

Although emotional behavior can be viewed as an organized, integrated process, it can also be viewed as a state of disturbance or upset. In the first chapter of this book we defined *emotion* as the disturbed or disorganized aspect of the total emotional event.

In contrast to the view of McDougall are the views of certain other psychologists who have described the conscious emotion as a state of confusion or blur. As an example of this view, the following is quoted from a paper by Howard (1928). In his account, the conscious emotion is described as a confusion or blur—a vagueness or haziness in the sensory experiences of the subject. Howard has described also the way in which an emotional consciousness clears up.

The stimulus as it first appears is unclear and inadequate; the motor reactions incipiently started are confused. In what form was this uncertainty actually experienced by our subjects? We found that it appeared in a variety of forms—which we called “blurs.” Many observers reported kinaesthetic blurs—actually experienced in arms and body. Some reported concrete visual fogs or hazes. Let me quote some rather unusual reports of this kind. “There was a definite grayness before me,” one subject reports, “as I sought to discover the stimulus. The stimulus seemed to clear up through this gray haze, each part becoming definitely meaningful.” Again: “Even those first stimuli, simple as they were, just worried me; that is the only word I can use for it. Why, I could not always see the signals, and I was looking right at them. They come and go just as though they possessed some freak capacity.” These are instances of actual visual blurs, reported by competent observers. We had many observations on kinaesthetic blurs, which were frequent and typical. Other blurs might be called intellectual, since they had to do almost exclusively with meaning—vision and kinaesthesia remaining under control.

Our observers reported, also, that the blurs, concomitant with the initiation of the reconstitutive process, cleared up, sometimes suddenly, sometimes gradually, as the adequate response emerged. This was to have been expected, since it is precisely the function of the attentive or reconstructive processes to make things clear—to remove blurs. We secured introspective evidence, very definite in character, to show that the final formation of the response was attended by a heightened feeling of clearness, as if light had suddenly been let in upon a state of obscurity. “When the blur dissipates,” one observer told us, “the feeling of relaxation is quite marked.” Another said, “The feeling of uncertainty and the lack of clearness passed away when the stimulus was seen in its true relation, and I was prepared to respond.”

I wish now to advance the thesis that in the emotional state, in its true form, what is experienced is an enlargement and irradiation of the original blur. Introspectively, as well as objectively, emotion is a state of disruption. [145-146]

This view appears to be incompatible with that of McDougall, but when we realize that the total conscious process of emotional excitement can be viewed in either of the two above-mentioned ways, we see that the views of McDougall and Howard are supplementary rather than contradictory.

Emotion as a Conscious Attitude. Still another view of the conscious emotion is one which emphasizes the subject's awareness of the inducing situation and especially his attitude toward that situation.

During emotional excitement the subject is actively predisposed toward or against the inducing situation or object. In a theoretical paper, Irons (1897) made the point that the difference between "pleasure-pain" and the emotions is that in "pleasure-pain" we passively accept what comes along, whereas in the emotions we are actively disposed. Thus, he wrote: "Pleasure-pain is simply the way in which things affect us, while emotion is the manner in which we react. . . ." And again: "Whatever is at variance with the individual's interests and wishes causes pain, but anger does not appear until he feels that he is 'injured.' Any bodily disorder is painful, but the sense of danger must be present before fear is aroused. Admiration and contempt imply the recognition of worth and its opposite respectively. Hate presupposes that the object of feeling is cognized as a hostile personality."

Irons' paper stresses the subject's awareness of the inducing situation and his attitude toward it as constituent factors in the emotional consciousness. He points out, to illustrate, that meeting a bear in the woods is a different experience from meeting a bear in a cage at the zoo.

A similar emphasis upon attitudes is found in the writings of Judd (1917). In discussing certain fundamental attitudes he pointed out that *fear* is a strong negative attitude. "Anger," he wrote, "is a mental attitude which accompanies an effort to throw off restraint. There may be blind rage in which the angry man beats aimlessly at everything which is within reach, or there may be the subtle studied anger which step by step proceeds to the final attack." The latter implies an anger attitude. Similarly there are attitudes of love, disgust, hate, etc.

There can be no doubt that such attitudes play an important rôle

as factors which determine the emotional consciousness. But emotion and attitude cannot be identified with each other. For one thing, *non-emotional* conscious attitudes have been frequently observed.

In a summary of the introspective studies of thought, Titchener (1909) wrote:

The attitude most frequently reported is that of doubt, with the cognate forms of uneasiness, difficulty, uncertainty, effort, hesitation, vacillation, incapacity, ignorance, and the opposite experiences of certainty, assent, conviction that a judgment passed is right or wrong. To the old-fashioned psychologist all these terms have an emotive ring, and it is worth noting that the same observers refer to surprise, wonder, astonishment, expectation and curiosity as emotions. But there is another group of attitudes that do not carry the emotive suggestion. These are described, in confessedly roundabout phrase, as remembrance of instructions, remembrance that one is to answer in sentences, recollection of the topic of past conversations, realisation that nonsense-combinations have been presented earlier in the experimental series, realisation that sense or nonsense is coming, realisation that a certain division will leave no remainder. Here we are in the sphere of intellection. . . . [101-102]

These non-emotional attitudes are important factors in the conscious life but, as Titchener pointed out, they are cognitive rather than emotional. All things considered, it is wise to distinguish emotions from attitudes rather than to identify the two concepts. As a fact, however, emotions and attitudes are intimately related, and the conscious emotion is often associated with conscious attitudes. The attitude is a *part* of the total emotional experience but by no means the whole of it.

Concluding Statement about the Conscious Emotion. Each of the foregoing views of the conscious emotion is a partial one, presenting one aspect or phase or interpretation. We do not have to choose among them, but rather we should accept them all and ask for more. When considered as partial views, the different accounts can be fitted together into a more complete picture.

Titchener is correct in pointing out that the emotional consciousness is an affective experience, for emotion belongs within a larger group of processes characterized by pleasantness and unpleasantness. James and Titchener are both correct in emphasizing the rôle of organic sensation in the experienced emotion. In Chapters V and VI of this book we discussed the bodily changes of emotion; these bodily

changes, whether objectively described or subjectively experienced, are an essential part of the total emotion.

McDougall has emphasized the integrated, organized behavior (instinct) which underlies the emotional consciousness. There is no doubt that our emotions are intimately associated with biologically basic impulses. But the emotional event is only in part an organized process. It is equally correct to stress the disruptive aspect of emotional experience and to describe the conscious emotion as a state of confusion or blur.

Finally, the emotion arises out of a psychological situation and the subject's awareness of that situation, especially his conscious attitudes and motives, is an essential component of the total emotional experience.

CONCLUSION

The literature of psychology contains a number of partial descriptions of the emotional consciousness. One writer emphasizes the awareness of those bodily changes which occur during emotional upset as the essential constituent of felt emotion. Another stresses the awareness of instinctive activity and impulses toward or against the object of emotion. Still another points out that an emotional experience is characterized by blur and confusion. Again, the conscious emotion has been described as being chiefly the awareness of an attitude.

Most of these and other descriptions of the conscious emotion supplement each other. They are not all contradictory. To use an analogy, the situation in this part of psychology is similar to that of a man in a dim and little-known place. He turns a search light in this direction and in that. Always this reveals some part of his environment. These partial views are not obviously contradictory, but they give an incomplete and inadequate understanding of the world which is being explored.

An important subjective distinction is that between pleasantness and unpleasantness. Since pleasantness and unpleasantness have not been reduced to something else, or related in a one-to-one way to any objective process, they must be recognized for the present as primary data of psychology. Pleasantness and unpleasantness are also of basic importance from the genetic point of view. The reader will recall

that in the discussion of emotional development (Chapter IV) a distinction was drawn between delight and distress. This differentiation between pleasant and unpleasant emotions can be made at an early age.

One result of our analysis of the affective processes is the finding that conscious feelings and evaluations are dependent upon the attitudes of the subject. But attitudes are not to be identified with felt pleasantness and unpleasantness nor with emotions. One can, however, learn about attitudes through a study of affective processes.

Broadly considered, the whole subjective description of feeling and emotion is but one part of the total problem which confronts the psychologist. The emotional event must be described from the chemical, physiological, behavioral, and situational points of view, as well as from the strictly subjective standpoint of the consciously experiencing individual.

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READING SUGGESTIONS UPON AFFECTIVE EXPERIENCE

The experimental literature upon affective experience has been well summarized and presented by Beebe-Center (1932) and more recently by Ruckmick (1936). These works will be found useful to the advanced student who may wish to study some special point in affective psychology. A scholarly review of the earlier introspective literature can be found in Titchener (1908). Another classic in this field is Lehmann (1914). Troland's (1928) book contains a significant discussion of affective experience in relation to human action.

Note upon the James-Lange Theory of Emotion¹

W. James' paper "What is an emotion?" appeared in *Mind* in 1884. C. Lange's paper was published in Danish in 1885 and translated into German by H. Kurella in 1887 under the title *Ueber Gemüthsbewegungen*. James restated his theory in 1890 in his *Principles of psychology*, Vol. II, Chap. 25. Lange's article has been translated into English from Kurella's German edition in a volume edited by K. Dunlap: C. G. Lange and W. James, *The emotions*, in the Psychology Classics Series (Baltimore: Williams and Wilkins, 1922). Some of the more important historical references are contained in Boring's *A history of experimental psychology* (New York: Century, 1929; 502-504, 532).

For an introduction to the criticism of this theory the student is referred to: W. B. Cannon, The James-Lange theory of emotions: A critical examination and an alternative theory, *Amer. J. Psychol.*, 1927, 39, 106-124; W. B. Cannon, Neural organization for emotional expression, in the *Wittenberg symposium on feelings and emotions* (Worcester, Mass.: Clark Univ. Press, 1928; pp. xvi + 454). Cannon's theory has been criticized by E. B. Newman, F. T. Perkins, and R. H. Wheeler, under the heading: Cannon's theory of emotion, a critique, *Psychol. Rev.*, 1930, 37, 305-326. This criticism was answered by Cannon: Again the James-Lange and the thalamic theories of emotion, *Psychol. Rev.*, 1931, 38, 281-295. Citations of other experimental studies of the theory can be found in Bard (1934).

This theory has been discussed by Ruckmick (1936) in a chapter entitled: The James-Lange-Sergi Theory.

¹ This note has been copied from the writer's *Motivation of behavior*, p. 482.

CHAPTER VIII

DIRECT DETERMINANTS OF EMOTION

In any consideration of the factors which determine emotional disturbance a distinction must be drawn between: (1) those determinants which directly arouse or excite emotional behavior, and (2) the predisposing conditions.

The present chapter will be limited to a consideration of the direct determinants of emotion: intense motivation; frustration; conflict; release of tension. The following chapter will deal with the predisposing conditions of emotional disturbance.

INTENSE MOTIVATION

If motivating factors are added together or if the intensity of a single painful stimulation is gradually increased, the activity level of an organism rises. Up to a certain point increased motivation is indicated by greater speed of movement, by an increment in the strength of muscles, by more rapid learning, and by increased efficiency in carrying out a task. But if the degree of motivation passes a certain critical point, emotional disruption occurs. For example, if a man, in the laboratory, is sorting spools according to size, a weak electric shock for errors in discrimination increases both the accuracy and speed of his performance; but if an intense shock is administered, he makes random and excessive movements with arms and legs, frowns, cries out in pain, and attempts to escape from the task at hand. Intense pain can disrupt any activity. With intense painful stimulation a man is said to "lose his head," "go to pieces," or "become temporarily unbalanced."

In experiments reported below, the intensity of motivation was systematically varied. Laboratory animals were trained to make a visual discrimination under varying degrees of electric shock or punishment. Although these experiments were concerned mainly with learning in relation to motivation, they still illustrate an important point in the psychology of emotion.

The Yerkes-Dodson Law. In a series of experiments performed by Yerkes, Dodson, and others, an electric shock (pain-punishment) was used as an incentive to habit formation.¹ The intensity of shock was varied systematically, with weak, moderate, and strong currents being employed.

The experimental task confronting the animal was the discrimination between two brightnesses. The subject was given a shock for an arbitrarily defined "error."

There were two main experimental variables in the work of Yerkes and Dodson: (1) the degree of electric shock which was used as punishment for an "error" in discrimination; (2) the difficulty of the discrimination to be made.

Difficulty of the discrimination was varied by changing the relative brightness of the stimulus-fields. The *easiest* task was a discrimination between black and white. Black and white doors were presented side by side in a spatial arrangement determined by chance.² The discrimination was made *more difficult* by substituting two grays for the black and white. The difficulty was further increased by using two grays which were close together in brightness—very similar.

Various subjects have been used in work of this kind, including mice, chicks, kittens, and men. The general results of the work are presented schematically in Fig. 25.

The vertical line of the figure represents the number of trials required to learn a discrimination, the zero point being at the bottom and the maximal number of trials at the top. The base line represents degrees of electric shock (pain-punishment) from weak at the left to strong or intense at the right. Curve *A* presents the general result when the discrimination is easy; curve *B*, when it is moderately difficult; and curve *C*, when it is difficult.

The figure is designed to bring out three main points. First, there is the fact of optimal motivation. For a task of any given degree of difficulty it is possible to find a degree of motivation which produces learning in the fewest number of trials. Up to a certain point, for any task, an increased degree of motivation speeds up the process of

¹ The present brief discussion of the work of Yerkes, Dodson, *et al.*, is based upon the writer's book, *Motivation of behavior*, pp. 280-287, which may be seen for references to the literature.

² If *black* is positive, the animal can escape through the black door to food; but if he enters the white door, he is given a shock through the feet.

learning (reduces the number of trials required to learn). Beyond this critical point, further increase definitely retards the speed of acquisition. The optimal, of course, is defined in terms of the experimental results; these results indicate that such an optimal or critical value can be determined.

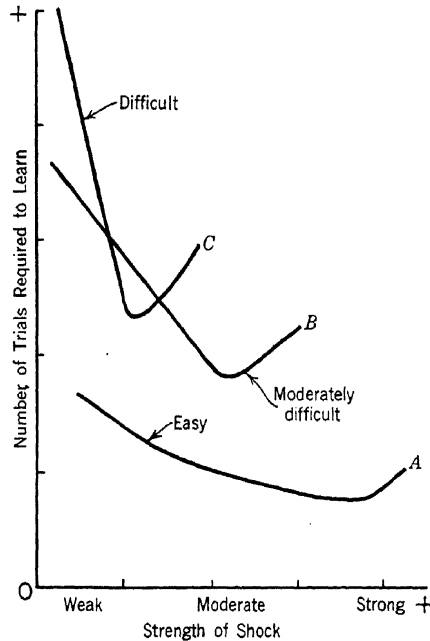


FIG. 25. SCHEMATIC DIAGRAM TO ILLUSTRATE THE YERKES-DODSON PRINCIPLE.

The second point illustrated by the curves is one in which we are much interested. The learning process is definitely retarded by intense, painful stimulations. The painful stimulations temporarily disorganize the activity in progress. When the degree of motivation is above the optimal value, we can speak of overmotivation.

The third point is the principle known as the Yerkes-Dodson law. This principle relates the difficulty of the task to be learned to the optimal degree of motivation. The principle may be stated as follows: *As the difficulty of a task increases, the intensity of pain-punishment which gives an optimal speed of learning approaches the threshold value.* In other words, this means that for a difficult task a *weaker*

shock gives optimal speed of learning, and for an easy task a relatively *stronger* shock gives the optimal learning.

If this principle turns out to be generally valid, it will have a number of practical applications. For example, if a bright boy and a dull boy are working upon the same problems in arithmetic, these problems will be relatively easy for the bright boy and relatively difficult for the dull. If optimal learning is desired from both boys, weaker degrees of "punishment" or other motivation should be given to the dull child than to the bright. This is contrary to the practice of giving the stupid child a thrashing "to knock sense into his head."

Also, from the standpoint of emotional disturbance, it follows that the difficult task is more readily disrupted than the easy task. If a man is repairing a watch or doing some other task requiring precision of movement and motor control, or a task requiring difficult discrimination, he becomes upset emotionally by a situation which would scarcely faze a ditch digger.

It may be assumed that for any task there is a breakdown point. If incentives and tensions are added together, one upon another, eventually a point is reached at which the smooth, coördinated activity is disrupted and the more primitive response patterns and visceral activities appear in the individual's behavior.

FRUSTRATION

When an older child takes away from a younger one some mutually desired toy, what happens? The younger child may attempt to get back his toy and, in the process, fight the older (aggression). The younger child may cry or scream, turn red, make excited movements (emotion). Possibly he will tell his mother of the incident and appeal to her for help. Perhaps he will abandon the toy and turn to some interesting activity such as climbing a fence (substitution).

Frustration and Aggression. It is the thesis of Dollard and others (1939) in the group at Yale that, whenever aggressive behavior appears, the aggressive individual is in some way frustrated. The converse of this proposition is not true because, as we have just seen, frustration may lead to other types of response than aggression.

In the simplest form of aggression the agent directly attacks the object or situation which frustrates him. There is an impulse to attack and destroy, or at least to remove, whatever thwarts one's

motive. In the more complex forms of social behavior a man may attack some symbol or surrogate of the one who thwarts him. Thus, burning in effigy is a substitute attack. Often aggression is limited to words, as when one swears or calls the enemy names. Retaliation may be indirect and deferred, as when one plans some way to "get even."

The two following illustrations of the aggression-frustration hypothesis are quoted from the book prepared by the psychologists at Yale.

1. A college student was driving to a distant city to attend a football game. It was the Big Game of the season and represented an important event in the season's social festivities. He was accompanied by a girl whose good opinion he valued highly and whom he wished to impress with his extensive plans for a weekend of parties and amusement. They became very gay and hilarious during the course of the drive and he was silently congratulating himself on the successful arrangements he had made. Suddenly a siren sounded behind him and, when he stopped, the traffic officer reprimanded him severely and in a very insulting manner for "driving like a high-school kid." The sound of the siren and the officer's intrusion immediately destroyed both his rapport with the girl and the happy anticipations he had had. As soon as he was permitted to drive ahead, he began berating the manners of the officer and telling the girl that the police in that state were notorious for their bullying methods. During the remainder of the drive he seemed to have difficulty with his car; he grated the gears frequently in shifting, refused to let other cars pass him, and made insulting comments about every policeman who came in sight (though, of course, slowing down whenever they appeared). The change in behavior here is not very baffling. The student was frustrated by being humiliated before his girl; his expectations of favorable response from her diminished. His behavior became aggressive because of his hostility toward the policeman which he could not express directly and which kept bubbling up after the arrest. [12-13]

2. A group of laborers . . . had gathered around a boarding-house table at six o'clock for dinner, as was their practice at the end of the day. On ordinary days they ate without much conversation but with a fair approximation of dignity and good manners. On the day in question, the group sat down at the usual hour but no waiters appeared. There were soon murmurs of protest to the general effect that, if the landlady were to stay home, dinner could be served on time; and threats were made that they might stop boarding at that house. Gradually the self-restraints usually governing behavior at the table disappeared and there was a rhythmic stamping of feet. Someone shouted, "We want food"—the rest took up the cry and produced a tremendous uproar. Hard rolls were seized from the table and thrown at the kitchen door, presumably in the direction of the landlady. Soon the object of their aggression appeared and explained

the reason for the delay. Dinner was eventually served and the unusual behavior gradually died down, but with many threats and mutterings. Frustration was induced by the inability to continue those responses habitually connected with sitting down at a table and aggressive acts assumed the form of the breaches of etiquette, vociferous demands, shouted threats, and bread-throwing. [13]

The Conditions Which Determine Hostile Attack in Animals. The question, *Why do men and animals fight?* is a timely one. To justify the destruction of human life in warfare, the militarist has argued that nature is red in tooth and claw, that evolution has resulted from the natural selection of the physically fit, and that without a struggle to the death the human race would degenerate. Actually, however, coöperation and socialization within a group are facts of nature just as truly as competition, fighting, and aggression. On the surface of things there is no obvious biological reason why men should not coöperate for the larger human welfare, seeking to eliminate the undesirables of disease, poverty, crime, and war.

In an ethical essay, Craig (1921) claimed that the militarist's argument for war does not agree with the facts of animal behavior. What, he asks, are the facts? In seeking an answer he refers to his observations upon birds. Craig has carefully observed the behavior of pigeons. He writes: ". . . pigeons are a properly representative group: because, first, their behavior is typical; they quarrel and fight just about as much, or as little, as do the majority of birds. A healthy pigeon never allows another to trespass on his territory, or in any way interfere with his interests, with impunity. And, secondly, the pigeons are a 'dominant' group; that is to say, the pigeon family is found all over the world, it has evolved into a large number of species, and the number of its individual members is enormous. All signs indicate that the pigeon family is in the most flourishing condition and in a state of rapid, progressive evolution. If the members of such a group live and act in a manner contradictory to the militarist theory, this is sufficient to prove that the militarist policy is not necessary for the welfare or the evolution of a race."

Pigeons, of course, do fight. If the birds are crowded into quarters too small for them, they fight to a degree that is cruel and distressing. Each pair of birds insistently drives away the trespassers. But in nature they space out, keeping apart by moderate distances.

If a pigeon cote containing several compartments, each with its

own door, is set up, the birds choose compartments for themselves. It sometimes happens that two males choose the same door. Each tries to enter and make the place his own. They can and do settle the difficulty by fighting for possession of the compartment.

With reference to fighting in the higher vertebrates, Craig's thesis is this: Fundamentally, fighting among animals is not sought after or valued for its own sake; it is resorted to as an unwelcome necessity, a means of defending the animal's interests. Further, Craig states that when an animal fights he aims not to destroy but only to get rid of the enemy or of his interference. There is thus no true *appetite* for battle as there are appetites for food, water, mate, sleep, and elimination. Fighting is not a biological necessity in the sense that it is invariably required for continued existence of the individual.

This last statement suggests a possible answer to the initial question. The animal reveals in his behavior a number of specific motivating factors which lead him toward food, water, mate, to build a nest, to care for young, and so on. But fighting is not among these appetites in the sense that an animal must seek a fight in order to live. When his biological needs are met, he can survive indefinitely without fighting.

In support of this thesis is the following observation. In a well-known aquarium sharks are kept with small fishes. As long as the sharks are given sufficient food they do not attack and devour the other animals, but, in nature, as we all know, the hungry sharks would quickly prey upon them.

Craig is doubtless right in claiming that fighting is not a biological necessity for the individual, but his thesis should be supplemented by at least two statements: First, animals and men inevitably do get in each other's way and do frustrate one another in actual life situations. It is hard to imagine a world completely free from mutual interference. It is especially true that animals do compete for food, mates, shelter, and the other necessities of existence; and the brutal fact remains that countless organisms continue to survive only by devouring other organisms. A second biological fact is that the process of evolution has produced a great diversity of organs for offense and defense—the spur, claw, tooth, quill, sting, sword, shell, and so on. This same process of evolution has laid down within the nervous system the structural organization which provides the bodily mech-

anisms necessary for attack and for the mobilization of those internal energies of an organism which are required in fighting.

Thus, the militarist's argument that the bodily mechanisms for fighting are widespread in the world and that they are fundamental in human nature is essentially sound. From this biological truth, however, it does not follow that men must inevitably destroy each other in battle.

Wars arise from *social* situations which preserve national patriotism instead of international coöperation and perpetuate political enmities and the struggle for face saving. Economic competition for the natural resources of the world is another cause of warfare. Economic competition between national groups creates problems which in the past have been solved on the primitive basis of brute force and not in courts of law. The social situation is clearly at fault and must be changed, in the light of our knowledge of human nature, to meet the needs of men.

Conditions Which Arouse Anger. In everyday life there are many minor irritations, annoyances, and frustrations which lead to retaliation and anger outbursts.

Gates (1926) has reported a study in which fifty-one women students kept a record of their experiences of anger or extreme irritation during one week. Among the concrete causes of anger these were mentioned: unjust accusations, insulting or sarcastic remarks, contradictions, criticisms, scoldings, unwelcome advice, others who "know too much," being bossed by parents or by friends, being teased, having work left to be done by the subject, having to wait for friends, not being invited to a party, being shoved or stepped on, having hat pushed off, having one's seat taken, the sight of others being rude or unjust, disobedience of children, having a request refused, spilling the ink, being locked out, wrong phone number, having a radio or typewriter that doesn't work, umbrella or fountain pen or money lost, clothes injured, glasses or watch broken, hair that wouldn't stay up, light that went out, making a fumble in dressing or sewing, dog that refused to obey, elevator or bus too slow, study or sleep interrupted, store not open, physical pain, unsatisfied hunger. This list suggests the well-known classification of annoyances by Cason (1930).

In 115 out of 145 cases, Gates found, *persons* rather than *things*

were reported as the main source of anger. Thwarting the impulse of self-assertion was the most frequently mentioned cause. A depreciating remark or incident which lowered the level of self-esteem usually aroused anger or at least an attitude of resentment in the subject.

Incidentally, the impulses which were experienced during anger, according to the reports, were these:

<i>Impulses</i>	<i>N</i>
To make a verbal retort	53
To do physical injury to offender (to slap, pinch, shake, strike, choke, push, step on, scratch, shoot, beat, throw out of window, kill, tear to pieces, throw something at, spank)	40
To injure inanimate objects	20
To run away, leave the room ¹	12
To cry, scream, swear	10

The figures at the right indicate the frequency with which an impulse was mentioned. Other impulses which have frequencies of less than ten are not listed above. The list shows that retaliative behavior is the most frequently mentioned. Emotional diffusiveness (crying, screaming, swearing) is relatively infrequent with adults.

CONFLICT

Although the terms *frustration* and *conflict* occur commonly in the psychological literature, a clear distinction between them is rarely drawn. We shall use the term *frustration*, broadly, to designate any kind of blocking or thwarting of a motive, and the term *conflict* to refer to those forms of frustration in which two or more motivating factors are involved.

An example of simple frustration which is free from conflict is the following. A child, in trying to get a toy, is frustrated by the environmental situation—the toy is out of reach. His total behavior is oriented persistently toward the single goal. Being frustrated, he cries.

An illustration of conflict between two forms of behavior is the following, observed by the writer in the behavior of his dog. To understand the conflict one should know that Prince had become

¹ Avoidance during emotional excitement is ordinarily regarded as a sign of fear; but on the basis of these reports we conclude that avoidance may also occur in anger as a mark of resentment. This form of avoidance is not an impulsive escape from a dangerous object but rather a deliberate act of retaliation.

thoroughly habituated to following his master's auto for a few blocks when it left the house. One day it happened that the dog's food was brought into the yard just as the auto left the garage. A conflict in behavior was obvious. Prince first ran toward the foodpan, wagging his tail; then he turned toward the auto and followed it, barking excitedly; again he ran toward the food, jumping and barking in excitement. A moment before this happened he had been sleeping quietly beside the garage door. The two incompatible activities, called out by the total situation, produced emotional excitement.

Not all conflicts result in emotion. But it has been claimed that all emotion (or at least all *excited* emotion) depends upon a state of conflict.

The theory that all emotion depends upon a state of conflict will be considered in the following section.

The Conflict Theory of Emotion. In 1894-95, John Dewey published two articles upon the theory of emotion. These papers had less effect upon psychological thinking than they deserved to have, partly because the intricate style and speculative argument made them difficult reading and partly because psychologists, at the time the papers appeared, were preoccupied with the James-Lange theory of emotion.

In 1927, Angier restated Dewey's conflict theory of emotion and showed the psychological significance of the argument it presents. In simplified terms Dewey's argument is essentially as follows:

Whenever a series of reactions, which is required by the purposive set of an organism, runs its course to completion, the result is a satisfaction which abolishes the purposive set. If other reactions can be integrated with the activity in progress and do not impede it, there is no emotion; but an emotion arises when these extrinsic reactions are so inconsistent with the activity in progress that they cannot be integrated with it.

There is then a resistance, an interference with the activity in progress. There is a conflict between activities for which the individual is already set and extrinsic reactions which frustrate them. Such a conflict, Dewey states, constitutes an emotion.

For example, a man riding a bicycle is hurrying to an important engagement. He passes a friend and waves a hearty greeting; waving

the hand does not interfere with the bicycle riding in any appreciable way. The friend, however, stops the rider and engages him in a lengthy conversation. Concerned over reaching his destination on time, the cyclist is thrown into a conflict and becomes emotionally disturbed by the delay.

Whether one holds that the conflict merely gives rise to an organic disturbance which, when consciously felt, *constitutes* the emotion is not germane to the main issue. *Without* a conflict, there is no emotion; *with it*, there is. Fundamentally, Dewey believes, an emotion is a conflict state.

In the first paper, Dewey (1894) pointed out that the so-called "expressions of emotion" are in reality reduced movements and postural adjustments which originally were useful and which persist as bodily attitudes. If the complete act of an "expression" were present, it would be one, as Darwin claimed, which is biologically serviceable. Thus, in the bodily attitude of anger a man bares the canine teeth, leans forward, and clenches his fists. The complete biological act would be biting, striking, and other forms of hostile attack. Similarly, the "expressions" of romantic love are the beginnings of the complete sexual act.

The integrated reactions which lead the organism to biologically useful goals normally include the vegetative processes. The latter reinforce and facilitate the activity in progress. But if the purposive act is frustrated, these vegetative processes, instead of reinforcing the useful act and making it more efficient, now interfere. The awareness of these vegetative changes absorbs the subject's consciousness.

Dewey's view agrees with more recent psychology. We know today that the visceral changes which are evoked by a biological emergency energize the individual and prepare him for a vigorous and prolonged fight or flight. If for any reason vigorous action cannot ensue, these same bodily changes are disturbing and constitute the physical basis of the experienced emotion. The subject feels the cold sweat, the palpitation, the heaving chest.

In his second paper, Dewey (1895) developed further his conflict theory of emotion. In addition to the emotional upset or seizure, he states, there are two other phases of emotion. (1) An "emotion" is a disposition toward a particular mode of conduct, a form of purposive

behavior or purposive attitude. Thus, during an emotion the individual seeks to fight, to flee, to copulate, or to carry out some other purposive act. (2) The complete emotional experience is always oriented with respect to some object. If one is angry, he is angry *at* someone or *on account of* something; if one is afraid, he is afraid *of* or *about* something. There is always the object *toward* which or *against* which the "emotion" is oriented. Even in those pathological states of emotion which are objectless, such as certain anxieties and depressions, the individual, Dewey states, goes on at once to supply an object.

The bodily changes of emotion are consciously felt by the individual. These organic repercussions in emotional experience symbolize the entire effort of an organism to adjust itself to the necessities of life. Thus, an angry man is aware of the pounding heart, the clenched fist, the posture of attack; these conscious returns from a wave of discharge, symbolize a fight.

There is no reason to assume that biologically primitive acts (fighting, running from danger, etc.) and all other purposive behavior originally had a conscious emotional quality. In so far as these acts are integrated and can be carried on without any blocking, they are free from emotion.

In summary of Dewey's theory, we repeat: Certain activities, formerly useful in themselves, have become reduced to mere action tendencies or to bodily attitudes. As such, they now serve to arouse useful actions and to realize ends. But when some difficulty arises in adjusting this activity (represented by the attitude) to other activities, there is a temporary struggle, a partial inhibition of one or both activities, with organic reverberations. This conflict state *is* an emotion.

More recent conflict theories of emotion take account of physiological facts which were not known to men of science when Dewey wrote. One instance of a general conflict theory is that of Hodge (1935).

He points out that the brain can respond to a situation which confronts the individual: (1) through efferent visceral excitation *via* the thalamic region, or (2) with specific skeletal movements and postures patterned in the cerebral cortex, or (3) by a combination of visceral and skeletal reactions determined in both the thalamic and cortical

regions. Emotion is aroused, Hodge states, whenever the higher centers of the brain fail to provide a fitting response to the perceived situation or when some doubt, hesitation, or conflict is aroused as to one's ability to respond successfully. Thus: "*Emotional reactions are inversely proportional to the ability of the higher centers of the brain to meet a given situation.*"

A more specific conflict theory is that of Darrow (1935). After reviewing the experimental evidence, he states that the centers which regulate *excited* emotion are located in the hypothalamus. This is evidenced by the fact that, after surgical decortication, the animal still has a high capacity for emotional arousal; but, after the destruction of a certain area within the hypothalamus, erstwhile "wild" animals are changed into docile ones. (This last point was demonstrated by the surgical operations of Ranson and his associates upon monkeys.)

The rôle of the cerebral cortex is: (1) that of differentiating stimulus patterns, and (2) that of maintaining an appropriate inhibitory control over the subcortical mechanisms of excitatory response. These two functions become significant in any explanation of emotional excitement.

If circumstances arise which involve a threat to the physical or intellectual equilibrium of an individual and which necessitate an active, dynamic conflict, there is a release of the primitive autonomic (subcortical) mechanisms of *excited* emotion. An essential condition of emotion is that the cortical patterns precipitating the conflict shall be occasioned by perceptual or ideational "stimuli," demanding some action on the part of the individual. This limits the assumed conditions of emotional excitement to a neural state of dynamic conflict.

In a word, just as surgical decortication frees the lower centers from cortical control, so a conflict of impulses produces a functional decortication (or "excortication") which weakens or largely removes cortical inhibition, in this way rendering the individual more excitable emotionally. This theory, Darrow explains, is limited to *excited* emotion. Another mechanism is involved in such emotional states as grief, sorrow, remorse, embarrassment, amusement.

In the latter characteristically human emotions the cerebral cortex plays the major rôle. These emotions are socially conditioned, and depend upon the subject's interpretation of his complex situation.

The Experimental Study of Conflict. There can be no doubt that a great many emotional disturbances rest directly upon a state of conflict or frustration. Where life or death is at stake or where marriage or social status or something else of basic importance to the individual is in the balance, the conflict is likely to be a highly emotional one.

Luria (1932) studied human conflicts from the standpoint of the disorganization of behavior. The situations which he examined were vital. For example, he tested students who were awaiting a critical examination, upon the outcome of which their whole educational career depended. He tested persons suspected of murder before their trial or, again, just after their conviction. He found that in such tremendously important conflicts the normal behavior of the skeletal musculature is strongly disturbed.

We know that with less important conflicts there may be little or no emotion. If the conflict is over the choice of a path—right or left—there may be hesitation or possibly some slight annoyance, but there is no great emotional upset. Again, the mathematician who pauses to consider which of two operations to perform is not emotionally disrupted by the conflict.

The psychologist must distinguish between emotional and non-emotional conflicts; or, better, he must distinguish among different degrees of affective disturbance which are associated with conflict states.

At the present time psychologists are experimenting upon conflict wholly apart from the context of emotional disorganization. The analysis of conflict is important for its own sake, apart from the problems of emotion. An illustrative experiment upon conflict is described below.

The experiment rests upon a distinction among three forms of conflict.

1. In the first type of conflict the subject is caught between two impulses to approach (approach-approach conflict). A child, for example, is offered an open box of candy and invited to take a piece. His eye and hand wander over the box and finally waver between two pieces. At length the child takes the largest piece in the box! Again, in the writer's food-preference experiments, a rat is permitted

to approach a pair of foods which are presented side-by-side in glass tubes (page 133). Ordinarily the animal goes directly to one food and eats it without hesitation, or he may eat the foods alternately with little hesitation. Occasionally, however, when the animal's demand for the two foods is about the same (as evidenced by the fact that a food preference is in the process of reversing), there is a definite conflict. The rat may then be seen to alternate for several seconds, sniffing both foods before finally accepting one of them.

2. In the second type of conflict the subject is caught between two impulses to avoid (avoidance-avoidance conflict). For example, a school child is told, "If you don't study your arithmetic lesson, you will be punished." Again, in an early experiment upon motivation a rat was placed in cold water. He climbed onto a shelf. Then he was given an electric shock through the feet; he jumped back into the water. When the temperature was lowered, he climbed onto the shelf again. In such situations severe conflicts develop. The individual finds himself between the devil and the deep blue sea!

3. In the third type of conflict the subject is caught between an impulse to approach and an impulse to avoid (approach-avoidance conflict). A child, for example, is set to approach a dog and pet it, but he is frightened by the size and manner of the animal. As a result he approaches part way and stops with obvious hesitation.

All three forms of conflict have been studied by Brown (1940) in experiments aiming to isolate the factors which contribute to the development of conflicts.

Underlying Brown's work is the assumption of goal gradients of approach and of avoidance. To illustrate what is meant by a goal gradient, consider a hungry rat at one end of a long alley with food at the other end. The animal has become habituated to the apparatus. When placed in one end of the alley, he runs to the food with a constantly accelerating speed. As he approaches the goal, both in space and in time his level of activity rises. He runs more and more rapidly (Hull's speed-of-locomotion gradient) and, when given a test, pulls more and more strongly against a steel spring (Miller's energy-expenditure gradient). There are not only gradients of approach but also gradients of avoidance. If, instead of receiving food, a rat is given an electric shock at one end of the runway, he thereafter tends to

avoid the spot where painful stimulation was received. If placed near the pain-producing end, he runs away—rapidly at first and with great energy expenditure, but more and more slowly and less energetically as he recedes from the source of painful stimulation.

Brown's apparatus for measuring gradients and producing conflicts is diagramed in Fig. 26. It consists of an alley, two meters in length and twelve centimeters wide, covered with a celluloid top to keep the rat from escaping. On the floor is a grid of stainless-steel wire through which the rat can be given a shock. Food cups (not shown in the figure) are located at both ends of the runway.

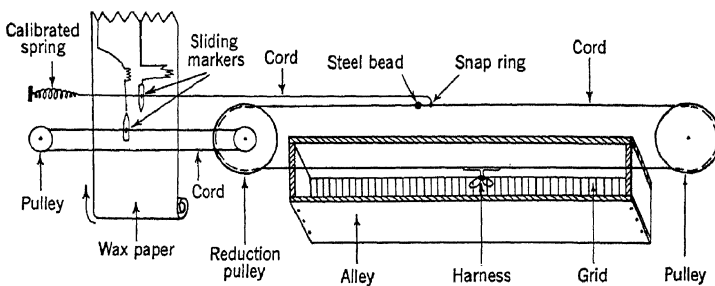


Diagram of Apparatus for Strength-of-pull Measurements

FIG. 26. APPARATUS FOR STRENGTH-OF-PULL MEASUREMENTS. (After Brown.)

In studying the approach-approach type of conflict, the experimenter habituates the rat to receiving food at both ends of the runway. The animal is then placed in a central compartment and quickly released. When the avoidance-avoidance type of conflict is being examined, a rat is first shocked at the ends of the runway and then released in the central position. In experiments upon the approach-avoidance type of conflict, the rat is first trained to run the entire length of the alley to food at the far end. Then he is given a painful shock at the food end. After this, when the rat is placed at the far end of the runway, a conflict develops. The animal approaches part way toward the food, then hesitates, wavering back and forth, but finally he stops somewhere along the path. The point at which the rat comes to rest can be predicted, roughly, from the gradients of approach and avoidance.

The strength-of-pull gradient is measured by a special apparatus.

Before a rat is placed in the runway a harness is attached. This harness consists of two sturdy rubber bands passed through a swivel hook and around the animal's thorax and neck. The harness is fastened to an endless cord which moves over two pulleys. A continuous record of the rat's movements along the alley is obtained by means of a reduction pulley and a moving strip of waxed paper.

When it is desired to measure the rat's strength of pull at some point along the alley, a snap ring, firmly attached to a calibrated spring, is placed around the endless cord. A steel bead engages this ring and, as the rat surges against the harness, a graphic record of the pull is obtained by means of a sliding marker.

Through measurements made with this apparatus it was discovered that a hungry rat pulls harder to reach food when 30 centimeters away from it than when at a distance of 170 centimeters. Similarly, his pull to avoid a painful shock was decidedly greater at a distance of 30 centimeters from the source than at 170 centimeters.

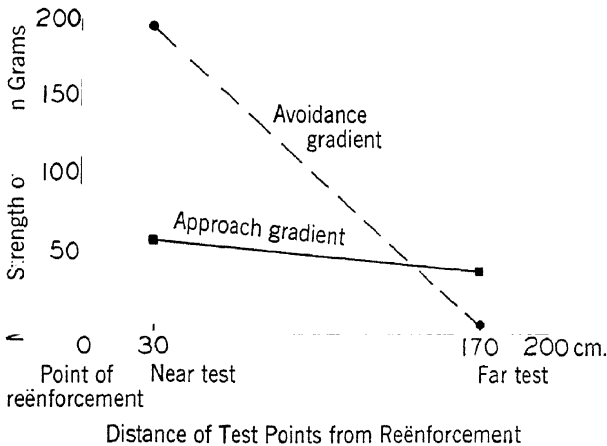


FIG. 27. GRADIENTS OF APPROACH AND AVOIDANCE MEASURED BY STRENGTH OF PULL AGAINST A SPRING. (After Brown.)

Figure 27 presents the facts graphically. The vertical at the left indicates the average strength of pull in grams for a group of rats. In the experiment under consideration, measurements of the strength of pull were made at two points: a point 30 centimeters from the end of the runway (near test) and a point 170 away (far test).

First an approach gradient was determined by measuring the rat's strength of pull against the spring while oriented *toward* the food. Then an avoidance gradient was obtained by measuring the strength of pull as the rat attempted to move *away from* the painful shock which was administered at the "zero" end.

In this experiment it was found that much stronger pulling was exhibited by the rat when escaping pain than had previously been shown in attempts to reach food. At a distance of 170 centimeters from the charged grill, however, the pull of pain-avoidance was zero. The point at which the gradients of approach and avoidance crossed was assumed to be the point at which the rat would come to rest in moving toward the goal from a distance.

The rats actually did come to rest in the general area predicted from the gradients. A rat would start at the far end of the runway and move toward the goal, but as he neared it his behavior would be checked (avoidance impulse). There was hesitation between approach and avoidance in the region indicated by the crossing gradients. Precise prediction of the point of rest, however, was not possible.

Critique of the Conflict Theory of Emotion. We have just seen that conflicts are being studied for their own sake without any reference to emotion. The study of conflict is a major problem in the broad field of motivation.

The conflict theory of emotion affirms that without a conflict there is no emotion; with a conflict there is emotion; an emotion is a conflict state.

In criticism of this view it must be pointed out that there are non-emotional conflicts as well as emotional ones, and that conflicts are being investigated by psychologists without reference to emotion. These points were mentioned above. But there is a second criticism of the conflict theory of emotion.

There are emotions of satisfaction and relief as well as those of frustration and conflict. For example, when the armistice was signed at the close of the first World War, people on the streets of Paris "went crazy." They shouted, laughed hysterically, jumped up and down, kissed each other, and showed other signs of great emotional excitement. There were parades of pedestrians, street dances; vehicles were decorated; church bells boomed forth and their tones mingled

with noisy horns and rattles. The excitement produced by victory and complete release of tension was great indeed! Similar celebrations occurred in other cities throughout Europe and America. The situation on November 11, 1918 brought great joy and relief.

When relief brings a tragic result—as in defeat or bereavement—there is an unpleasant affective tone along with the release of tension.

The conflict theory of emotion, therefore, must be modified to take account of the fact that emotional disorganization is produced by the sudden solution of a conflict—the abrupt release of tension—as well as by the conflict state itself.

Finally, a distinction must be drawn between the acute manifestations of conflict and the more persistent state of conflict within the individual. The persistent state of conflict may be latent for an indefinite period or it may be actively aroused. In any case, an emotion is an acutely disturbed state and not a persisting conflict within the individual. Examples of persisting states of conflict, discussed elsewhere in this book, are: grief, anxiety, the anger conflict with a determination to “get even” or “square accounts,” romantic love. These states of conflict endure within the individual when they are not being revealed by emotional disturbances.

RELEASE OF TENSION

Two contrasting affective states in which there is frequently a release of tension are grief and joy. Joy is typically a pleasant state in which there is smiling, laughing, and excessive random activity. The joyful child, when promised a trip to the circus, jumps up and down, whistles or sings, laughs, claps his hands in anticipating the event, etc. His eyes are bright from increased lacrimal secretion.

The joyful individual assumes a posture in which the extensor muscles dominate the flexors; the head is thrown back, the chest is up and the shoulders are back, an erect carriage suggests strength and alertness. Grief presents the opposite picture. The head is bowed. In posture the flexor muscles dominate the extensors so that the body is bent over and sagging. There is frowning accompanied by weeping or sobbing. The activity level is low.

Plates X and XI show typical facial expressions of joy and grief in the child. Although the photographs are limited to the region of

the face, the contrast in the tonic changes of the skeletal musculature extends to the entire body.

The affective states of grief and joy will be considered in the following sections.

Grief as an Emotion and as a Persistent State of Non-adjustment. As an event in human life grief can be recognized by weeping or sobbing, by tears, immobility, and a flexed bodily posture. From the subjective point of view there is often a "lump in the throat"—probably the experience of a smooth-muscle spasm in the alimentary tract at the level of the throat. The grieving person may repeat, over and over again, some word or phrase which symbolizes the origin of his grief.

In grief the individual is frustrated by the loss of some person or object or opportunity which he values. In grief there are at least these two factors: (1) an appreciation of the value of that which is lost, and (2) an awareness of the loss itself.

According to the view of Lund (1930), which was referred to on page 258, the tears of weeping indicate a mixed emotional state rather than pure dejection. The discharge of tears occurs typically when a depressing situation gains a redeeming feature or when the tension of an unpleasant situation is somewhat relieved or alleviated. For example, a wife whose husband had died three days previously seemed to have been stunned by the blow, showing no outward signs of emotion except extreme depression; she broke down in tears when a friend brought a beautiful wreath. Again, the son of a physician had been run over in the street. The mangled body was taken to the hospital where an operation was performed. The boy died a few hours later. The physician wept for the first time when the boy's mother related a beautiful incident from the boy's behavior that morning.

Pure depressions such as those found in depressive psychoses are tearless, but patients not infrequently become lacrimose in a transitional state when passing from a depressed to an exalted phase. Lund concluded that the pathological conditions most favorable for tears are those of mild euphoria and mixed emotional states such as occur in paresis, multiple sclerosis, general arteriosclerosis, and pseudo-bulbar palsy.

Lund's remarks regarding the shedding of tears emphasize the

fact that the emotion of grief is an acute manifestation of a conflict state. This conflict state may be of brief duration or it may last for years. Everyone has heard a statement something like this, "John never got over grieving when his wife died." Such statements imply that the individual was not able to adjust himself to the world after the loss of his wife.

Normally a state of grief remains until the individual can make some readjustment to changed circumstances. Under some conditions a person may never become wholly reconciled to his loss. In the following case the individual actually took steps to perpetuate her grief. The behavior of the woman, described by Guthrie (1938), is abnormal.

A mother was overcome with grief at the sudden death of her young son during an influenza epidemic. Instead of making a gradual readjustment she took steps which made it difficult for her to forget the loss. The boy's possessions were left undisturbed in their places about the house, except for an occasional dusting. At dinner a place was regularly set for him as it had been during his life! Her conversation was devoted to the lost son. This state of affairs continued for a good many years.

The picture is complicated by the fact that the woman was unhappily married and had come to resent her husband's presence in the home. Also, she had an hysterical type of personality, evidenced by the fact that she had learned to get her way by crying and by other indirect means. She was not clearly aware of the motives behind her actions. In the present instance she used her grief to annoy her husband and to impress the world with her great loss, thus drawing attention and sympathy to herself.

Her inability to forget consisted in arranging her life so as not to forget. The acquiring of a new interest, or a move to a distant city or to another house, or even carrying on her routine in the same home would have helped this woman to forget her loss. A room with sad memories tends to lose those memories if one works in it with thought upon his work instead of upon his loss. But in the case described by Guthrie the sorrowing mother actually took steps to conserve her state of grief.

This illustration has been described in detail because it clearly shows the relation between an acute emotion of grief, on the one

hand, and a persistent affective state of the individual, on the other. In everyday life the term *grief* is employed to designate: (1) the emotional process, and (2) the persistent state of non-adjustment. If, therefore, we speak of a widow as grieving for months or years over the loss of her husband, this can only mean that the widow has not made a readjustment.

Joy and Laughing. The question, *Why do we laugh?* is one which has been much discussed by philosophers and psychologists. Various answers have been given. Hayworth (1928) summarized these answers in a paper developing his own theory of the origin and function of human laughter. The following list of diverse conditions which evoke laughter is based upon Hayworth's discussion:

1. The *triumph* over a conquered enemy brings laughter. This is seen not only on the battle field but also on the playground, at the card table, in carrying out practical jokes, and in other situations.

2. Any *surprise* which brings a feeling of superiority is likely to evoke laughter, as an easy victory in cards or a foot race.

3. The act of *tickling* induces laughter, especially with children. The tickler assumes the rôle of an attacker. In a playful way he stimulates parts of the body which are supplied with protective reflexes—the soles of the feet, armpits, ribs, the solar plexus. There is usually some element of surprise or uncertainty in the situation. The tickler makes a thrust, then ends with a light touch.

4. Telling a *funny story* is an obvious and direct attempt to produce laughter. Story telling is an art in which tension is first built up and then suddenly released. The story has (or should have!) a point—an unexpected turn or development.

5. Laughter is facilitated by a *sense of well-being associated with good health* of the individual or with social safety. If the subject is in excellent health, laughing is aroused by relatively slight provocations. Laughing may be analogous to sounds of contentment which are made by some animals, as the purring of a cat.

6. Laughter is frequently aroused by *incongruous situations*. Incongruity covers a considerable portion of humor. It includes the humor of unusual costumes, of bad manners, of foreign customs. In all these instances there is an element of surprise or of novelty, combined with the awareness that there is no cause for alarm. This element of incon-

gruity constitutes a large part of humor on the funny page, on the screen (e.g., the antics of Charlie Chaplin), in parlor jokes, funny stories, and so on.

7. Finally, *an individual sometimes laughs voluntarily* to cover up shyness or embarrassment, to show contempt or to conceal his thought. Such laughter is acted out for a purpose and is not to be regarded as the involuntary expression of emotion. Some persons in social situations laugh at the slightest provocation in order to appear cheerful and agreeable. This kind of laughter is a social pose rather than a "spontaneous" manifestation of joy.

According to Hayworth's theory, laughter developed as a form of communication. Laughter was originally a vocal signal to other members of the group that they could relax with safety. After a tense situation, in which there is impending danger or prolonged strain, laughter is the signal that all is well. Through the smile or the laugh one flashes this meaning: "Have no fear of me; I like you and will not hurt you; the situation is safe."

Hayworth's theory recalls Darwin's view that joy and friendliness in animal behavior are the antithesis of hostile attack. The cheerful, friendly dog, for example, exhibits patterns of response which are opposite to those of angry aggression (pages 101-107). Even though the friendly dog has no intention to communicate by wagging his tail, the friendly behavior is readily recognized by man and brute alike.

We believe that smiling, laughing, and various other manifestations of joyful emotion are best explained in terms of the release of tension. Voluntary laughter has a different explanation, for the individual may have a *determination* to smile or laugh or act in an agreeable manner. The pose of joyful emotion may closely resemble the involuntary emotional outbreak but, from the standpoint of motivation, the two activities are very different.

Release of Tension in Relation to the Affective Processes. It is easy to assume that the building up of tension through intense stimulation, frustration, or conflict is the source of unpleasant feeling, and that the release of tension through the satisfaction of an appetite or the relief of strain and anxiety is the source of pleasant feeling. In many cases this view appears to be sound. But as a general theory of

the affective processes the view is objectionable for reasons which follow.

In the first place, pleasantness is associated with activity as well as with passive relaxation and the release of tension. The neurologist Herrick (1915) stated his view in words which bring out the point under consideration:

The simplest view seems to the writer to be that the normal activity of the body within physiological limits is intrinsically pleasurable, so far as it comes into consciousness at all. There is a simple joy of living for its own sake, and the more productive the life is, within well-defined physiological limits of fatigue, good health, and diversified types of reaction, the greater the happiness. The expenditure of energy within these physiological limits is pleasurable *per se* except in so far as various psychological factors enter to disturb the simple natural physiological expression of bodily activity. Such disturbing factors are anxiety, want, rebellion against compulsory service, and unrelieved routine. The expenditure of intelligently directed nervous energy along lines of fruitful endeavor is probably the highest type of pleasure known to mankind. [257]

In the second place, the release of tension may be associated with either pleasant or unpleasant feeling. For example, if one is listening to election returns over the radio, the news of the success of one's candidate brings the smile of joy, but news that the enemy candidate has been victorious brings an unpleasant relaxation of sorrow and depression. When the final outcome of the election has been announced, there is a marked release of tension, but whether this release is pleasing or displeasing depends upon the returns.

Finally, there are non-joyous forms of laughter which depend upon the sudden release of tension. An example is the hysterical laugh. The writer has a vivid memory, dating back to high-school days, of the hysterical laughter of a middle-aged woman in a somewhat dangerous situation. Her house had caught fire. She was standing in the living room when the firemen started to remove the furniture. She objected to having a fine old oil painting taken down from the wall. The fire chief ordered the painting removed and asked the woman to leave the house. She refused and was forcibly taken out. As soon as she was outside the house, she emitted loud and prolonged peals of hysterical laughter.

This type of laughter is similar to normal laughter but more automatic, more hollow, and it seems to be more uncontrolled or abandoned. In hysterical laughter one cannot always be certain whether

the individual is laughing or crying, and sometimes laughing and crying alternate. In any event, the emotional disturbance can be attributed to a letdown of tension, even though one cannot determine whether the feeling is one of pleasantness or of unpleasantness.¹

It is important, therefore, for the psychologist to study the building up of tension and tension release without any bias as to the ultimate explanation of pleasantness and unpleasantness.

THE PSYCHOLOGICAL SITUATION

In the foregoing sections we have examined the direct determinants of emotion: intense motivation; frustration and conflict; the release of tension. These processes occur within an individual, but they are aroused always by a total psychological situation.

An emotion cannot be understood apart from the situation which induces it. It is not enough to understand that the adrenal glands activate the neuromuscular action system which prepares the organism for a fight or flight. We must understand also the total situation which evokes adrenal discharge. When, for example, we learn that John Smith has an attitude of hatred directed against constituted authority we can understand some features of his behavior. When we learn that this hatred goes back to an early hatred of his father, we begin to see that the external situation as well as the adrenal glands determines the emotional response of John Smith.²

What, then, is the nature of the situation within which excitations, frustrations and conflicts, and releases of tension arise?

Subjective and Objective Views of the Situation. It is not merely the physically present world which arouses feelings and emotions but the world as perceived and comprehended by an individual. Direct experience leaves its trace upon the individual. Through the recall of memory an individual can integrate the past with the present. Through the process of imagination an individual can anticipate an

¹ An emotional disturbance which is superficially similar to human laughter is that of the "laughing" hyena. While strolling through the London Zoological Gardens, the writer once heard the curious "laughing" of the hyena. Hurrying over to the cage, he discovered the situation which produced this "laughing." The keeper held the animal's daily supply of meat just out of reach. The hyena, while attempting unsuccessfully to get his food, "laughed." The crowd, hearing the demonstration, were themselves convulsed. But, if we judge from the situation and the animal's general behavior, this "laughing" indicated the annoyance of frustration rather than any joyful emotion.

² See the discussion of the psychological situation in Chapter I, pages 48-50.

impending event and prepare to meet it in advance of its actual occurrence. Thus, the overcast sky recalls a previous drenching by rain and one prepares for a similar storm by taking a raincoat and umbrella. It should be pointed out that the psychological situation includes not only the objects, events, and relations of the experienced world but also one's self as acting within the world directly experienced.

The objective view of the psychological situation is very different. From a strictly objective point of view, the psychological situation is made up of a physical organism in a dynamic or behavioral relation to its physical environment. The objective situation is not the environment alone or the organism alone but a nexus of environment and organism in dynamic interrelation with each other. The energies of the environment excite the organism and the organism in turn responds with a back action against the environment.

Identification in Relation to Affective Arousal. When we attempt to describe exactly the nature of the psychological situation within which affective processes arise, we are confronted with the interesting and important fact of *identification*. The human individual lives vicariously within parts of his external world.

If one is forced to witness the distress of another human being and can do nothing to relieve the suffering, one will probably experience an emotion. When, for example, the great dirigible *Hindenburg* burned at Lakehurst, New Jersey, the onlookers were horrified. They heard the cries of the victims and saw them leaping to their death. Nothing could be done to save them. It was a *horrible* accident.

The word *horror* correctly designates the emotion which arises when one witnesses a great tragedy or the torture of a loved one. The ruthless destruction of some valued object—the bombing of an ancient cathedral—may “fill one with horror.” Most people are emotionally disturbed (not necessarily horrified) when they see an animal in danger or in pain. The three following observations of the writer illustrate the point.

1. A kitten had climbed up into the bed springs. Jimmy, aged five and a half, tried to catch her but in the attempt pulled her in such a way that the kitten's paw became caught in a spring. She hung by one foot, crying plaintively. Jimmy was much disturbed by the outcry

and called for help. At last a housemaid came to the rescue and crawled under the bed to extricate the kitten. While the kitten was being freed, Jimmy stood beside the bed crying and jumping excitedly. There was nothing he could do to relieve the distress of his pet and he was definitely emotional about the whole situation. When at last the kitten was freed, Jimmy's excitement quickly subsided.

2. A housewife for the first time had to cook a live lobster by dropping the animal into boiling water. After much hesitation she dropped the lobster into the kettle and put on the lid. Then she left the kitchen weeping. Later she laughed and again wept. The emotional disturbance, aroused by taking the life of an animal, lasted ten minutes or more and ended with the comment, "I don't want to cook any more live lobsters."

3. A girl of nine stood on the curbstone. Her dog started to dash across the street directly in front of an oncoming auto. "Oh," she exclaimed and at the same instant raised both hands as high as her head. The gesture was a protective reflex. But the *pet* was in danger and not the girl!

In the above examples the common principle is that an emotional disturbance is aroused in a person witnessing the distress or danger of an animal. Even though the observer himself is in no danger, an emotion is evoked.

Witnessing an emotion in some other person tends to arouse emotion in the onlooker. McDougall (1920) has argued that the perception of an emotion in someone else tends to arouse the same emotion in one's self. Thus, in a panic it is the perception of fear in others which makes us afraid even though we do not know the source of the fear.¹

¹ Floyd Allport (1924) has criticized McDougall's doctrine of the sympathetic induction of emotions on the ground that it presupposes an innate ability to perceive the emotions of others and to recognize them when they occur. That such an innate ability exists is doubtful in the light of experiments upon the recognition of facial expressions of emotion. The experimental evidence indicates a rather low degree of ability to recognize emotions from facial expressions. Allport states that it is not the direct emotional behavior of the person so much as the knowledge of the conditions affecting him that makes it possible for us to understand and sympathize with his state of mind. Again, Allport argues that the facts of life are against McDougall's theory. If, for example, we witness the anger of two men who are fighting, our anger is not necessarily aroused. Instead we may be amused, frightened, or interested, according to circumstances.

A child will weep sympathetically upon seeing his mother weep. Persons smile or laugh when in the presence of others who express their feelings of gaiety. In this connection, the writer recalls a vaudeville performance in which an actor came to the center of the stage and simply laughed. He said not a word but just stood there laughing. In a little while the people in the audience began to snicker and finally they were laughing uproariously.

If we abandon McDougall's hypothesis that the perception of an emotion in someone else arouses the same emotion in us, we must still explain the fact that the observation of emotion in another person does evoke *some kind of emotional response* in ourselves. At least this frequently happens.

The writer believes that the psychological process known as *identification* is involved in situations similar to the above. In reading a novel, watching a play, hearing a radio broadcast, or following a comic strip, the individual is clearly aware of the total situation and experiences well-marked satisfaction, frustration, anxiety, grief, resentment, amusement, or other feeling, as the plot unrolls. The feeling or emotion which is aroused depends entirely upon the circumstances. This is true not only in fictitious situations but also in the drama of real life. More or less unconsciously the individual identifies himself with certain parts of his external world. Events within these spheres of personal interest arouse emotional disturbances. For example, the mother is emotionally disturbed by events which affect the welfare of her child even though these events threaten no harm to her directly. The same mother, however, flicks out the life of a fly or an ant without emotion. The difference lies in the fact that she is interested in the child, concerned about him, identified with him, but not with the fly or ant. Thus, the process of identification greatly increases the range of possibilities for affective arousal through external situations.

CONCLUSION

The factors which produce emotional upset in man and animal are of four main varieties.¹ First, intense and persistent stimulation may emotionally disrupt smooth behavior. Second, frustration of a

¹ In Chapter X these four factors are reduced to three, frustration and conflict (which are intimately related) being regarded as one.

strongly motivated activity may produce emotional disorganization. Third, a state of conflict in which something important to the individual is involved, is likely to arouse an emotional disturbance. Fourth, the sudden release of bodily tension—as in laughter, great joy, or the sexual orgasm—is apt to evoke an emotional upset.

The first three of these factors are closely related. Intense stimulation, frustration, and conflict, considered together, constitute a general source of emotions which are subjectively unpleasant. The fourth factor—release of tension—is frequently a source of pleasant emotions. There are sound reasons, however, why one cannot identify the release of tension with pleasant feeling and the increase of tension with unpleasantness.

These excitements, frustrations, conflicts, and releases arise out of the psychological situation and must be considered in relation to that situation.

The psychological situation is not merely the physical environment. It includes the total behavioral relationships between an organism and its external world. Subjectively considered, the psychological situation includes memories, thoughts, and imaginations, as well as perceived events and objects. A recalled conflict, for example, or an anticipated injury may arouse an emotion.

The number of possible circumstances within which emotion arises is large, owing to the process of identification. Through identification the excitements, frustrations, conflicts, and satisfactions, which are observed in the lives of other persons or portrayed upon the screen or radio or in a novel, arouse within the subject a wide variety of feelings and emotions.

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CHAPTER IX

PREDISPOSING CONDITIONS OF EMOTIONAL DISTURBANCE

The main psychological factors which directly arouse or excite emotional behavior have been considered in the foregoing chapter. In addition to the *exciting* factors—intense motivation, frustration, conflict, sudden release of tension—there are others which are *predisposing* toward emotional disturbance.

As a matter of convenience, the factors which predispose the individual toward emotional disturbance will be presented under two main headings: previous experience and organic conditions.

The previous experiences of an individual leave him with attitudes, motives, and states of conflict which are definitely predisposing toward specific forms of affective response. This is especially apparent in those nervous breakdowns which are the result, in good part, of frustrating experiences.

The second or organic group of predisposing conditions includes all purely physical and chemical processes within the body in so far as they are related to emotional disturbances. The functioning of the endocrine glands, physical injuries, illnesses and the general state of health may all predispose the individual toward emotional disturbances.

The general plan of the present chapter is to consider first the rôle of previous experience in emotion and then the part played by organic factors.

THE RELATION OF PREVIOUS EMOTIONAL CRISES TO PRESENT BEHAVIOR

A housemaid requested a small boy not to play on the piano *My Old Kentucky Home* because, she said, that particular piece made her feel sad and weep. She explained that a man to whom she had once been engaged used to sing this song, sang it at their final parting, and that it still reminded her of him. The love motive had been

thwarted, and this particular song tended to arouse the whole conflict of unrequited love. The song recalled the past and reinstated a persistent conflict with all its conscious emotion. In this particular case there was also an element of self-pity (the *poor-me* attitude).

Everyone knows that past conflicts, frustrations, excitements, and satisfactions leave their traces upon the individual. Another illustration of this principle is the following. The writer recalls that, as a boy, it was his duty to turn out the lights and raise the window just before getting into bed for the night. One night after the lights had been turned off he was lifting the window when a gun exploded just below. Voices and the sound of men running down the street were heard. One of the neighbors called out, "What happened! There he goes!" The whole experience was so terrifying that for years after the event the raising of that particular window in the dark brought fear. He would not admit this fear to others in his family but attempted to conceal it. Only the moving to another house eventually solved the problem.

It is obvious from the above examples that a previous emotional crisis predisposes the individual to a particular form of emotional behavior. What is the relation between previous experience or training and present affective reactions? What, especially, is the relation between previous *emotional* experience and present *emotional* disturbances? Materials in the following sections bear in one way or another upon these questions.

The Cultural Basis of Emotion. It is axiomatic that if we wish to understand present behavior, we must know the psychological history of the subject.

The importance of *cultural* factors in determining attitudes and consequently affective responses is a point stressed by Klineberg (1940). On the basis of several studies which he cites, the following facts are stated.

Among the Murngin of Australia, if twins are born, the mother kills one of them because it makes her feel like a dog to have a litter instead of one baby. With the Negroes of the Niger Delta, the rule is that both the mother and the twins are put to death. Occasionally the mother is allowed to live, but her life is little better than a living death for she becomes an outcast and must live the rest of her days in the forest. Less than a thousand miles from this group live the

Bankundo of the Congo Valley, among whom the mother of twins is an object of veneration. She is entitled to wear a special badge and her name is changed to "Mother-of-twins."

With such wide differences in practices and attitudes, it is not surprising that an event such as the birth of twins is greeted in one area with joy and in another with unpleasant emotion—grief, humiliation, or fear for one's life.

The same can be said about death. In most known cultures death is a source of grief. In some cases, however, it is an occasion for rejoicing. Certain groups of Siberian natives and of Eskimos as well as of Fiji Islanders are said to be anxious to die before they become too old. These people believe that the present life is a prelude to an everlasting existence in which the individual will possess the bodily and mental powers he had when leaving this life. If a man lives until decrepit, he remains so in the hereafter. For this reason a son may kill his parents, secure in the conviction that this is doing them a great favor. A sincere belief in immortality may thus determine one's feelings and emotions with regard to death.

Whether a particular belief is scientifically true or false is psychologically irrelevant. The culturally determined attitudes are conditions of the affective responses. Any serious attempt to understand the affective life of primitive peoples must rest upon an analysis of their culture—their practices and attitudes.

Learning To Like and To Dislike. Some experiments published in Russian have been referred to in a brief note by Peters (1937). According to the account, young children were required to indicate which of a series of colors they liked and which they disliked. After this, each child was shown a *disliked* color and given a chocolate; he was shown a *liked* color and at the same time food was withheld or a food that was little desired (biscuit) was presented. This plan associated the approach response with a *disliked* color and the avoidance response with a *liked* color. After a period of conditioning, the children again rated the colors, and in most instances, according to the report, there was an inversion of the original hedonic reaction.

The experiment shows that one may learn to like and to dislike, that through training one can and does acquire positive and negative reaction tendencies which may run counter to pre-existing likes and

dislikes. Everyday experience confirms this result. We like the foods, music, persons, and places to which we have become accustomed.

The Etiology and Nature of Phobias. A phobia is the persistent fear of a specific object or situation. High-sounding names have been invented to designate phobias: *pyrophobia* (fear of fire), *odontophobia* (fear of teeth), *doraphobia* (fear of fur), *thanatophobia* (fear of death), and so on. But these names add only the air of profundity to our understanding of what is actually involved psychologically. High-sounding labels explain nothing.

To illustrate a specific phobia, a case reported by Bagby (1922) will be cited:

A man suffered from a phobia of being grasped from behind, the disturbance appearing early in childhood and persisting to his fifty-fifth year. When walking on the street he was under a compulsion to look back over his shoulder at intervals to see if he was closely followed. In social gatherings he arranged to have his chair against the wall. It was impossible for him to enter crowded places or to attend the theater.

In his fifty-fifth year he returned to the town in which he had spent his childhood. After inspecting his old home, he went to the corner grocery and found that his old boyhood friend was still behind the counter. He introduced himself and they began to reminisce. Finally the grocerman said this, "I want to tell you something that occurred when you were a boy. You used to go by this store on errands, and when you passed you often took a handful of peanuts from the stand in front. One day I saw you coming and hid behind a barrel. Just as you put your hand in the pile of peanuts, I jumped out and grabbed you from behind. You screamed and fell fainting on the sidewalk."

The episode was remembered and the phobia, after a period of readjustment, disappeared. [17]

In commenting upon this case and another (in which a young woman developed an irrational fear of running water) Bagby states that phobias have these features in common: (1) The phobia originates in a traumatic episode during which the subject reacts with intense fear. (2) There is an element of guilt or unpleasantness in the original experience which prevents the subject from talking about it. This presumably leads to repression, *i.e.*, to protective forgetting, for typically the subject is unable to recall the psychological origin of his phobia. (3) The symptoms of fear disappear when it becomes possible for the subject to recall the traumatic experience.

A phobia, Bagby notes, may persist for many years. It is called out

repeatedly by a particular kind of object or situation having features in common with the object or situation which originally evoked the emotional display.

Another instance of a phobia, well known to the writer, is the following. A young woman, convalescing from a critical illness, was carried out of central China in a coffin-like conveyance. For many days she was carried by coolies over mountainous paths and across dangerous bridges. At the end of the journey she was thoroughly shaken by the jogging steps of the coolies and frightened by the repeated exposures to danger and especially by being confined within the small compartment without any possibility of escape. After that experience there developed a fear of being enclosed in small spaces (*claustrophobia*).

The phobia is revealed when the subject is enclosed in a space from which there is no immediate escape. If, for example, the train on which she is riding goes into a tunnel, an unaccountable fear develops. If, while in a beauty parlor, her head is placed in an electric drying machine, this same fear arises. Today, years after the original fear, there is a marked response of fear whenever she is enclosed in a small space. The phobia remains despite the fact that its origin is clearly known to the subject. No special attempt, however, has been made to remove this fear.

A phobia is not an emotion but rather a predisposition to a particular type of emotional response. The fact that a phobia may persist for years indicates that the individual has not become adequately adjusted to the situation which originally induced the fear response. When adjustment can be made, through aided recall or other psychological means, the phobia disappears.

So far as a phobia is a persistent state of non-adjustment within the individual, it is akin to a neurosis.

Experimentally Produced Neuroses. Nervous breakdowns were frequently observed among the soldiers of the first World War. In the midst of bursting shells and flying shrapnel the men inhibited the strong impulse to escape to a safer place. A stern sense of duty and an attitude of courage kept many men at the front. Also, they were compelled by military regulations to remain in places of danger. Some developed paralyses, aphasias, amnesias, and other symptoms which necessitated withdrawal to a hospital far behind the trenches

even though they were physically uninjured. They were not malingering but simply were unable to endure the strain of the fearful situation. They suffered from shell shock.

Nervous breakdowns, long known in man, have quite recently been recognized and described in laboratory animals. Pavlov (1927) first observed and reported the accidental production of a neurosis in laboratory dogs under circumstances described below. More recently "experimental neuroses" have been produced by various methods in the rat, the sheep, the pig, the cat, the chimpanzee, the dove, and the human child. A tremendously important field for research has thus been opened up.

Mowrer, in an unpublished manuscript (from which we are permitted to quote), turned to the works of Pavlov and Frolov for the facts. He described three main types of condition for producing neuroses experimentally. Mowrer's descriptions have been followed here:

Type 1. The first type of situation contains a threat to one's existence or security. Men and brutes occasionally meet dangerous situations which were not anticipated.

During the heavy floods of Leningrad, in 1924, water unexpectedly entered the living quarters of dogs used in various experiments which were then in progress upon conditioned reflexes. Before attendants could reach the scene, the water had risen to such a depth that the animals could keep their heads above it only with difficulty. To remove the animals through the low doors of their cells it was necessary for attendants to submerge their heads briefly under the water. During the terrific storm—amid breaking waves, the crash of falling trees, the rising of water against the walls of the laboratory building—the animals had to be removed quickly by making them swim in small groups from their kennels into another laboratory which was a quarter of a mile away. Here they were kept on the first floor, huddled together indiscriminately. All this excitement strongly inhibited the activity of the animals. Most strikingly, they did not fight or quarrel; they remained quiet and huddled together, which is unusual with dogs in a group.

All the animals were saved, but soon after the storm it was discovered that several of them had completely lost their conditioned salivary responses to ordinary stimuli such as light or sound. The ac-

quired responses were so thoroughly eliminated that only extensive training could restore them.

Moreover, one dog that seemed normal in behavior and that still reacted with the acquired responses exhibited fear when a very loud bell—one that had been previously used in the experiments—was sounded near him. Pavlov concluded that this loud sound gave the dog an emotional disturbance which was equivalent to restoration of the flood experience. He tested this hypothesis by a special experiment, producing a mock flood by letting water flow under the door into a room where the dog was on a raised stand. When the animal noticed the stream of water trickling along the stone floor, it fell into extreme agitation—panting, yelping, trembling. The experiment ended with a renewed impairment of behavior, which Pavlov attributed to a functional weakening of the nervous system through the shock. It was an artificially produced or "*experimental neurosis*."

Type 2. An "experimental neurosis" can be produced in a situation which employs pain as a signal of food. Pavlov demonstrated that a conditioned salivary response can be established to almost any kind of a signal, even in response to a painful electric shock. In one experiment a weak electric shock was used as a food signal and conditioned salivation was established. The dog showed no signs of the ordinary defense reaction against the shock but rather turned his head, licked his lips, and produced a conditioned salivary secretion.

Then the shock was increased in strength until it was very strong; it continued to evoke a conditioned response (*CR*). With an intense shock as a signal the salivary *CR* remained stable for many months; but there was a limit. After many repeated presentations there came an abrupt and complete break in behavior. No trace of the alimentary reaction could be found. There was only a violent defense reaction against painful stimulation. Even extremely weak currents were no longer effective to evoke the salivary *CR*.

The noteworthy feature of "experimental neurosis" under these conditions is the suddenness of the breakdown. Prior to the crisis, the dogs showed no sign of fearful anticipation. They appeared to be quite oblivious to the painful nature of the shock so long as it was the signal for food. Then, quite suddenly, the acquired reaction disappeared and pain-avoidance behavior dominated the animal instead.

The abruptness of the change has its human counterpart in certain nervous breakdowns. A man who has been regarded as a stable and dependable member of the town may suddenly desert his wife, abandon his job, and disappear from the community. Prior to this fugue he enacted a cheerful rôle in a situation which was mainly unpleasant to him. No one knew that he was poorly adjusted to his wife, threatened also by financial failure, and unable to face the impending disgrace of divorce and bankruptcy. All at once a total breakdown occurred.

Type 3. Experimentally produced neurosis occurs in situations which require an animal to make a discrimination up to and even beyond the limit of its capacity under the given motivating conditions.

One of the dogs in Pavlov's laboratory was being trained to discriminate between a luminous circle and an ellipse of about the same area which were projected upon a screen. The circle was made the signal for food, and the ellipse a sign that no food would be given. At the start the discrimination was easy; the axes of the ellipse were in the ratio of 1:2. As training continued, the elliptical form was made more and more circular by changing the axis ratio to 2:3, 3:4, 4:5, and so on progressively.

When the ratio 8:9 was reached, the dog, which formerly had stood quietly in its harness, began to struggle and howl, salivating to the presentation of both the circle and the ellipse. It tore off with its teeth the apparatus used for mechanical stimulation of the skin and bit through the tubes connecting the animal room with that of the observer. It barked violently, contrary to usual custom. In short, there appeared various symptoms of an acute neurosis. The animal developed a seemingly foolish fear (phobia) of certain geometrical figures and, to a less extent, of the experimental situation in which they had been encountered.

In this instance, as we noted, the animal was placed in a situation which called for discrimination beyond the limit of its capacity. It was highly motivated by a state of hunger. As the discrimination was made increasingly difficult, the conflict became unbearable and a breakdown occurred.

Incidentally, this result is what might be expected on the basis of the Yerkes-Dodson principle (pages 306-308) if we make the assumpt-

tion that motivation is of a constant degree and that the difficulty of the task is gradually increasing.

In human terms, this type of neurosis is akin to that which appears in a man who is highly motivated by having much at stake and who, under these conditions, is forced to solve a problem or to meet a situation which is too difficult for him. During the stress and strain of the conflict a breakdown occurs.

Further Types. In a survey of the methods used to produce experimental neuroses, Cook (1939) listed six types of situation. Three of the kinds of situation are described above. In addition to these, Cook described the following:

Type 4. A neurosis may develop in conditioning experiments when the interval of delay between foresignal and food (or shock) is gradually increased beyond a critical value. To illustrate, in one experiment the delay between foresignal and food was gradually increased by adding five-second increments to the interval employed. Under these conditions the animal became generally excited when the two-minute point was reached and at the end of a three-minute delay, as Pavlov states, he became "quite crazy," violently and unceasingly moving all parts of the body, howling, barking, and squealing intolerably. Further, toward the last there was a constant flow of saliva during the presentation of any stimulation, all signs of delay having vanished.

Type 5. A neurosis may appear when a transition between excitatory and inhibitory conditions is suddenly made. For example, in one experiment a cutaneous rhythm at the rate of twenty-four stimulations per minute was rewarded with food, and a rhythm at the rate of twelve per minute was not rewarded. When it was arranged that the twenty-four-per-minute rate would immediately follow the twelve-per-minute rate, at the same point on the skin, all the positive conditioned responses which had been acquired during the experiment disappeared completely. It was found, however, that conditioned responses could be slowly restored by retraining. In this instance the rapid transition from exciting to inhibiting conditions is believed to be the basis for the loss of conditioned responses.

Type 6. Neurotic symptoms sometimes appear when an inhibitory stimulation is changed by the experimenter into an excitatory one. To illustrate, in one experiment the clicking of a metronome at the rate of 120 beats per minute was made the positive signal for food, and clicking at the rate of 60 beats per minute was kept negative. After the animal had become accustomed to these signals, the experimenter began rewarding the 60-per-minute (or previously negative) rate. When the change was made, the responses to the formerly positive rate decreased and disappeared. Concurrently, certain other conditioned responses which had been acquired during the experiment were lost.

The above types of laboratory situation for producing neuroses are illustrative. The six types are by no means a complete classification of the available and possible techniques. But these examples are sufficient to show that when neuroses occur certain definite conditions prevail.

When experimentally produced neuroses appear: (1) the subject is strongly motivated; (2) the subject is frustrated, in conflict, painfully stimulated, or facing some other difficulty in attaining a goal; (3) there is no escape from the situation. These conditions are present, also, when there is a nervous breakdown in man.

Symptoms of Experimentally Produced Neuroses. We turn now from a consideration of the causation of "experimental neurosis" to the question of the signs or symptoms by means of which neurosis can be recognized.

One of the main symptoms of neurosis in man and animal is the loss of a system of habit organization. In the above illustrations the lost habit organization was: (1) that required in making a certain kind of conditioned response; (2) that required for a particular form of discrimination; (3) that utilized in delaying a response. On the human level, the loss of habit organization, whether temporary or permanent, is called an *amnesia*.

Another symptom of experimentally produced neurosis is a marked *change in the level of activity*. Pavlov's neurotic dogs, for example, revealed a greatly heightened activity level. They yelped and struggled excitedly; they bit and otherwise attacked the experimental apparatus. In well-known experiments upon the neurotic behavior

of rats, Maier (1939) and Maier and Glaser (1940) reported both an *active* and a *passive* phase.

Maier forced rats to make a visual discrimination, using the jumping technique developed by Lashley. At the start of each trial a rat was placed upon a raised platform facing two boxes which were closed by movable covers at the ends near the animal. One cover was clearly marked with a visible form, for example, a black circle against a white ground, which was made a positive signal for food. The other cover was marked with a form, for example, a white circle against a black ground, which was made a negative signal. If a rat jumped to the correct form, his impact knocked open the cover and he landed on the floor of the food box. If he jumped to the incorrect form, he received as punishment a bump against the firmly closed door and a fall. When a rat failed to jump, a current of air was directed against the rear of the animal thus literally putting pressure upon him to leave the platform.

In some of the experiments the visual cues were shifted indiscriminately by the experimenter, thus presenting to the animal a problem for which there was no possible solution.

Under these conditions rats developed neurotic behavior which presented both active and passive phases. In the course of the active phase the animals ran violently and exhibited convulsions and tics. Sometimes they hopped in a curious manner. The active phase was followed by a passive one during which there was extreme quiescence. In the passive phase the rat was apparently in coma. His body was plastic; he could be rolled up into a ball or moulded into various other postures which would be maintained for ten or more minutes. From the passive phase the animal gradually returned to a normal form of behavior.

Thus, in the light of Pavlov's early work and the recent studies of Maier and others, one can recognize *violent excitement* and *extreme passivity* as characteristics of experimentally produced neurosis in animals. These are the extremes in the level of general activity.

Investigators of neurotic behavior in animals have also reported numerous bodily changes in addition to the symptoms mentioned above. These include: *irregular respiration, acceleration and increased variability of the pulse rate, rigidity, tics, tremors, and disturbances in the diurnal activity wave.*

The symptoms of neurosis have been carefully described by Liddell (1938) in reporting his experiments with sheep. In this work he placed the neurotic sheep in an experimental frame with loops around his legs to hold the animal in place. Under these conditions electric shocks were administered following various foresignals. When a signal for an impending shock was given, the sheep's pulse rate was greatly increased; the acceleration persisted for many minutes after the shock. Labored breathing also appeared and remained for some time. Both pulse and respiration were irregular.

The neurotic sheep, Liddell reports, strenuously resisted being led on a leash from the barn to the laboratory. When harnessed to the experimental frame, he was hyperirritable in a stereotyped manner; there were persistent ticlike movements and at times tremors of the forelimb, accompanied by sudden starts and irregular respiration. Signals which were formerly negative to shock now evoked a vigorous flexion of the leg. The capacity to give delayed reactions vanished in the neurotic animal. When the signal for an impending shock was given, the pulse rate was greatly increased and irregular; the breathing was labored (as noted above).

Outside the laboratory the neurotic sheep showed a higher degree of neuromuscular activity than the normal animal, as determined by a pedometer. The normal sheep remained quiet at night but the neurotic animal was almost as active at night as during the day. When the neurotic sheep was given a long rest from laboratory conditions, it became as quiet during the hours of darkness as its normal companions, but after the experiment was resumed, its nightly activity again became greatly increased. The pulse rate of the neurotic sheep, as determined in the barn by means of a long-distance stethoscope, was found to be of far greater variability, both day and night, than that of the normal sheep.

The neurotic behavior appears to have a relatively stable basis within the nervous system. One sheep exhibited signs of neurosis for nine years until its death at 13.5 years; two animals remained in a neurotic state for six years. Absence from the laboratory for three years was without any substantial curative effect in these sheep.

Liddell reports that after a long rest the neurotic animals appeared to be normal in every respect, but when they were returned to the laboratory, placed in the apparatus, and given the painful shocks, the

characteristic overreaction and other abnormalities of behavior developed within a few days of experimenting. This finding suggests a general principle: When a situation once has produced abnormal behavior, the same situation is likely to produce abnormal behavior again when the animal is placed within it.

Research has not yet progressed far enough for one to make any statements regarding the means of correcting or changing the experimentally produced neuroses of animals. This is a matter of great practical importance which at the present time is being studied intensively.

Neurosis and Emotion. We have previously defined an emotion as an acutely disturbed state of the individual which has a psychological origin and which is indicated by marked changes in the visceral organs (page 51).

The neurosis is a relatively stable or chronic state of disorganization within the organism, which is revealed by a variety of symptoms: amnesias, tics, tremors, extreme activity or passivity, changes in pulse rate and irregular respiration, repeated emotional outbreaks, and other symptoms, as noted above.

The term *emotion*, as employed in this book, refers only to the *acute* disturbance. The emotional disturbance may leave in its train various non-emotional symptoms. But *neurosis* is the broader term.

ORGANIC FACTORS WHICH ARE PREDISPOSING TO EMOTIONAL DISTURBANCE

The operator in a beauty parlor one day seemed to be unusually cross and irritable. He was fussy and "nervous" in dealing with clients and with the other operators. As a customer left, the operator said to her, "Gee, my tooth just tortures me today!"

When one is in pain he is more easily annoyed, angered, or frightened than when serene. Painful stimulations which are intense and persistent lower the general threshold for the unpleasant emotions.

Pain, illness, fatigue, exhaustion, hunger, and other states of depletion render the individual subject to emotional outbreaks. Conversely, states of health, restedness, freedom from hunger, and comfort, favor quiescence and integrated behavior. An interesting bit of evidence which possibly bears upon this point is found in a careful study of anger in young children, which is described in the following section.

Anger in Relation to Organic State. In her investigation of anger in young children (aged one to eight), Goodenough (1931) studied the frequency of outbursts of anger in relation to the hour of occurrence. The hour of the day at which an outbreak of anger occurred was recorded by the mothers in 1842 out of 1878 instances of anger. On the basis of these data the mean number of outbursts per hour was computed for each hour of the day. The average frequency of outbursts per hour plotted against the hour of day is shown in Fig. 28. This curve reveals clearly the existence of a diurnal variation

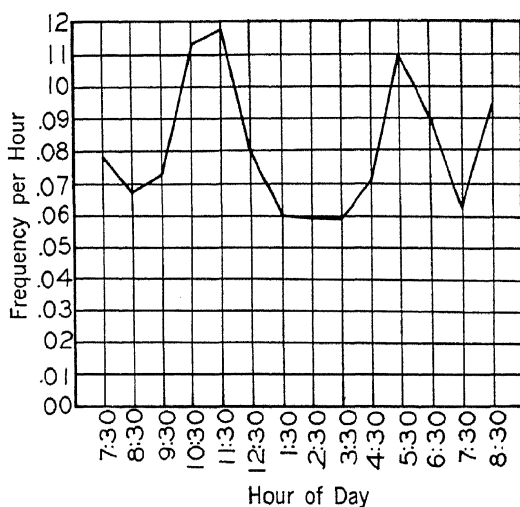


FIG. 28. PEAKS OF IRASCIBILITY BEFORE MEALS AND BEFORE RETIRING. (After Goodenough.)

in the frequency of the anger outbreaks. Anger in young children, according to these data, is reported most frequently just before meals and just before retiring. An obvious interpretation of the curve is that hunger and sleepiness make the child more irascible.

Apart from Goodenough's work, we all know, as stated above, that fatigue, hunger, pain, ill health, and similar conditions heighten irascibility and that a comfortable satisfaction of hunger and a well-rested healthy condition make for friendliness and freedom from anger. As a matter of practical common sense it is a good plan to ask a favor of a man when he is well fed, well rested, and in agreeable mood rather than when he is fatigued and hungry.

Health and Emotion. In this connection, we recall Stratton's (1929) conclusion that persons who at any time have been subject to severe illnesses tend in later life to respond more intensely to situations which arouse anger, and probably also to those which produce fear, than do persons who have been relatively free from diseases.

Stratton instructed more than a thousand college students to rate their emotions of fear and anger upon a specially arranged form. He also obtained the medical record of each student. These medical data were obtained from the examinations which had been given the students at the time of their entrance to college.

On the basis of the data two kinds of emotion score were computed—one which indicated proneness to fear and another which indicated proneness to anger. The two kinds of score were studied statistically in relation to the medical records. On the basis of his study the following conclusions were drawn:

1. Persons who at any time have been subject to severe illnesses tend in later life to respond more intensely to situations which arouse anger, and probably also to those which produce fear, than do persons who have been relatively free from disease.

2. Of persons who are alike in having had diseases, those individuals with a greater range or variety of diseases tend to respond more intensely to fear-producing situations than do those with a lesser range. The same is probably true for anger responses.

3. The period of life at which diseases occur is important for emotional behavior. With fear the results point to a greater significance of diseases during the ages of eleven to fifteen. For anger, there is clear evidence that persons subject to diseases in the first six years of childhood tend toward more intense emotional responses than do those whose diseases occurred in later age periods.

A possible interpretation of Stratton's result is this. Persons who have had a history of frequent and serious illnesses are more likely to be in a poor state of health *now* than are persons who have been relatively free from diseases in the past. In other words, we assume that there is some degree of positive correlation between the previous and the present state of health. If we hold to this assumption, Stratton's result means that ill health tends to make one more emotional.

The result may be valid for emotions other than anger and fear. We have heard that when a person is suffering from dyspepsia he may become consistently grouchy, sober, depressed. In one instance

known to the writer a person with chronic appendicitis became gloomy and dismal in his outlook upon life. After a surgical operation his condition became as cheerful and optimistic as it had been before the illness.

But regardless of how Stratton's findings are interpreted, the fact is significant that a history of serious illnesses is associated with proneness to responses of fear and anger.

Temperament. The problem of human temperament is an important one which was recognized by philosophers even before Galen formulated his classical doctrine of the four temperaments. The term *temperament* refers to the persistent type of affective response made by an individual. For example, we recognize that some individuals are chronically cheerful and others sober or depressed. Some individuals are active, excitable, and others are calm and quiet. Such temperamental differences can be recognized at an early age.

In a study of smiling and laughing among infants, Washburn (1929) grouped infants into types as follows:

1. Ambi-expressive (equally cheerful and sober).
 - a. Parvi-expressive (serene, tranquil).
 - b. Multi-expressive (excitable, emotionally labile).
2. Risor-expressive (cheerful).
3. Depressor-expressive (sober).

This classification of the temperaments of infants implies two main variables: (1) the factor of excitability, which is shown by quiescence or high activity; (2) the affective factor, which is shown by variations along a continuum from cheerfulness, through neutral or balanced, to sober or depressed.

The analysis of temperament is important practically because in addition to all-around ability, special aptitude, interest, information, skill, and physical traits, the temperamental characteristics of an individual contribute largely to his success or failure on the job and in social relationships. In view of the importance of the topic it is unfortunate that so little positively is known about human temperament. Instead of solid fact there is a wealth of speculation and *a priori* classification.

It is encouraging, however, to note that studies are now being made upon the temperament of animals. In a review of the literature

dealing with the temperament of animals, Hall (1941) defined temperament as "*consisting of the emotional nature, the basic-needs structure, and the activity level of an organism.*" Such traits as timidity, aggressiveness, sexuality, spontaneity, variability, speed of reaction, and activity are examples of temperamental traits."

Hall reports that experiments upon animals have been carried out for: fearfulness, timidity, emotionality, and wildness; aggressiveness and savageness, including the inheritance of wildness and savageness; activity; and miscellaneous traits such as persistence and speed of reaction. There are some temperamental traits which have been largely ignored by experimenters. Among these, Hall states, are: variability, reaction strength, docility, dominance, tidiness, cooperativeness, friendliness, grief, boisterousness, spontaneity, and gregariousness.

Future research will have to decide how far the last-mentioned traits can be classified as *temperamental* and how far under some other heading such as *social behavior* or *personality*.

The Endocrine Glands in Relation to Temperament. That the endocrine glands exert a profound effect upon human temperament has been widely recognized today.

Collecting evidence from many sources, Hoskins (1933) has pointed to some of the psychological effects of glandular imbalance. (1) In *thyroid* deficiency the effects vary widely from case to case. The subjects are rather commonly depressed in mood, the depression sometimes extending to a genuine psychosis which is scarcely distinguishable from the manic-depressive psychosis in the depressive phase. The patient shows a dissatisfaction with life, a distrust of his fellow man, and general unhappiness. In the myxedematous type of thyroid deficiency an irritability and oversensitiveness to annoyance appears. (2) In *parathyroid* disorders the patient may become "touchy," flying into ungovernable rage at the slightest provocation, such as an unfriendly look or a mildly critical comment. Under treatment with parathyroid extract, supplemented by calcium and sunlight, a striking improvement has been reported. (3) *Pituitary* deficiency and behavior problems are definitely associated. In one study of pituitary disorder the aberrations of behavior were such manifestations as moroseness, bullying, disobedience, lying, thieving, and vagrancy. (4) Surprisingly, in women the psychological effect

of *ovarian deficiency* is not particularly shown in the sexual sphere. Erotic desire often manifests no diminution and may even be increased. It is true, rather, that a deprivation of the ovarian hormones during the normal reproductive years results in a nervous tension and irritability. Commonly coupled with this are attitudes of self-pity and egoism and of hyperemotionalism. (5) In the male the effects of *castration* vary from individual to individual. If castration occurs early in childhood, normal male aggressiveness fails to develop. If castration is performed after puberty, a certain degree of masculinization may persist throughout life. But the emotional reactions of eunuchs are said to be defective. In one group they were reported to be cold and passive in the face of dire poverty, ugly in temper and moody, and to indulge in homosexual practices as well as in other sexual perversions.

If we inquire about the more normal relationship between endocrine glands and emotional behavior, we recall at once Cannon's emergency theory of the *adrenal glands*.¹ Cannon pointed out that the adrenal secretion produces a curious assortment of bodily changes which have one common value—utility in times of stress and during highly motivated behavior. Adrenal function serves to energize the body.

The *sexual glands*, when they reach maturity, normally bring into behavior the complex manifestations of sexual appetite and the associated emotions. With the onset of puberty, as Hoskins has put it, the maid "trims her sails to catch the breeze of masculine fancy according to the customs of her generation. The wiles of Eve come unbidden to her aid. Unwittingly she assumes her rôle in nature's great drama and the race goes on. Her less sophisticated sister falls in with the plot unresistingly. Her blushing reticences at once mark her for chivalrous regard of her future mate and reveal her as swaying to the rising tide of her hormones."

That such vital events as puberty, menstruation, pregnancy, lactation, and menopause have a profound effect upon the appetitive and emotional life of women is known to everyone.² The analysis of these

¹ Compare Cannon's statement on page 211 with the foregoing statements which are based upon Hoskins.

² While writing these lines, the writer noticed an adolescent housemaid, a girl of fourteen, who had repeated crying spells in the kitchen over the loss of a fifty-cent piece. The crying was so persistent that the girl was suspected of being emotionally immature. Later it turned out that this girl was painfully menstruating at the time of the loss. Her general state no doubt predisposed her to the spells of crying.

and other organic conditions in relation to emotional disturbances is an important field of investigation for the physiological psychologist.

The Diet and Emotional Behavior. When newly weaned rats are placed on a diet which is deficient in magnesium but adequate in other respects, they become hyperexcitable. According to the observations of Kruse, Orent, and McCollum (1932), the hyperexcitability becomes progressively more pronounced until the eighteenth day of deprivation, when any sudden disturbance throws the animals into a fright that is followed by a convulsive seizure. During the early stages of magnesium deficiency the rats are apprehensive and show alarm at the noise of crumpling paper or the opening of a door or a moving shadow. Almost any slight sound or movement will terrify them.

This emotional disturbance is only part of the behavioral display of rats which have been maintained upon a magnesium-low diet. The convulsive seizure, which finally leads to death, is spectacular:

The excitable animal, startled by sound, races at rapid speed in a wide circle until it finally falls on its side. The entire body of the animal is now rigid, with head stretched back, fore limbs extended at three upper joints and flexed at the metacarpophalangeal joint, and hind limbs extended backward. So fixed are the jaws that often the tongue is perforated by the clenched teeth. The skin presents a waxy appearance. All respiratory movements cease during the attack and return with relaxation of the musculature. Priapism may appear at this time and persist until death.

This stage of spasticity is succeeded by a period of relaxation lasting only a very short time. While still lying on its side, the animal exhibits twitchings in various regions, or paddles rapidly with all extremities. Coincident with this behavior, the animal's eyeballs become more prominent, the ears stiffen and project backward against the side of the head, and the fur stands erect. Then reappears a tonic spasm in which the rigid body assumes a typical position, with fore limbs pressed tightly against the thorax, fore paws clenched, and hind extremities extended. This spastic condition may give way to clonic contractions in which the fore limbs are extended from the body. Next the animal may suddenly leap into the air, at the same time spinning laterally several times; or it may "curl up" with marked flexion of all extremities; or it may do neither. There is marked cyanosis. Associated with the convulsive seizure is regurgitation of the stomach contents into the esophagus and mouth, as sacrifice experiments during this period have shown.

Within a short time the animal rears from the dorsal or lateral recumbent position in an attempt to stand, but its extremities will not support it. The animal buries its head in its outstretched fore limbs and propels itself forward entirely by its hind limbs, which, however, are so extended with paws hyper-

extended that the dorsal, not the plantar, surface bears the weight. Instead of forward motion, fine tremors may appear over the body. Throughout this stage the eyeballs are retracted.

Following the convulsive stage comes a recovery phase, doubtless dependent on exhaustion. . . . [522-524]

The convulsive seizure described above is definitely an abnormal manifestation. The account suggests at least two points of general psychological interest.

First, the *emotional* disturbance is only one manifestation of the total physical state of the organism. There are many purely physical symptoms of the deficient metabolic state (not here described), and there are *non-emotional* signs of disturbance in behavior. The account is interesting because it shows how difficult it is to draw a distinction between emotional and non-emotional symptoms of the deficient metabolic state.

A second point of interest is this. The case shows that there is a well-defined type of convulsive seizure associated with a specific dietary deficiency of magnesium. In other words, there is a uniform relation between abnormal behavior and a dietary lack.

Incidentally, this convulsive seizure is somewhat similar to that of neurotic rats, produced through extreme frustration and conflict.

The Psychiatric Approach to the Analysis of Temperament. One way to study differences of human temperament is to examine the emotional reactions of psychopathic individuals. The psychiatrist has recognized a number of pathological states of a strongly affective nature. The distinctions he has drawn can serve as guides to the analysis of temperamental differences in normal persons.

Very tentatively the following list of abnormal affective states is offered for study. The list is based upon the work of MacCurdy (1925), but his finer distinctions are here ignored.

1. In *manic psychoses* the patient is elated, restless, and distractible. The manic temperament is akin to the cheerful, active, alert individual of normal life.

2. In *depression* the patient appears sullen, inactive, and unresponsive. Some normal persons also are sad and gloomy in their behavior and outlook upon life. Perhaps they are the normal counterpart of patients who suffer from depressive psychoses.

There are also patients who vary from depression to mania (*manic-depressives*) just as there are normal persons who are moody—who have marked ups and downs of feeling.

3. There are pathological states of *apathy* characterized by lack of affective responses. In functional dissociation, for example, a patient who formerly took care of her mother, with normal feelings, became completely indifferent about her mother's death and spoke about her mother in a cold, matter-of-fact way. Apathy has its normal counterpart, perhaps, in the individual who appears to be "without heart," feelingless.

4. *Anxiety states* in the abnormal, especially those psychoses associated with the fear of death, are in some respects similar to normal anxieties and worries.

5. States of *perplexity and confusion* in psychopathic patients are, perhaps, in some respects akin to the normal confusion and blur of certain emotions and moods.

These and other similarities between abnormal and normal affective states must be considered in relation to the complex fabric of the total personality. The study of abnormal persons offers an opportunity to the psychologist because in them the normal temperamental differences appear to be exaggerated in intensity and distorted in form.

Individual Differences in Emotional Stability. Some persons fly into a towering rage at the slightest provocation. Others respond to the same situation in a matter-of-fact way; they are the more stable emotionally.

Individuals differ markedly in their tolerance of pain and frustration. As Guthrie (1938), writing of nervous breakdowns, has put it:

Probably any man could be placed in a situation which would bring on such collapse. Some situations are intolerable for any human beings. Central American prisons in the old days, solitary confinement in verminous dungeons, torture, cumulative misfortune can put any man in the condition which we describe as nervous breakdown. But there are great differences in what different individuals can tolerate. [231]

When painful, distressing factors are added together, the cumulative effect will sooner or later break down anyone.

The proneness to emotional upset as well as to nervous breakdown varies with age, habituation to an environmental situation, physiological state, and other factors. An adult can tolerate much more frustration than can a child, without showing emotion. The hardened soldier can tolerate without emotional upset more hardship than the new recruit; the veteran with composure can witness a horrible accident that would disrupt the newcomer. Fatigue, hunger, cold, loss of sleep, and similar conditions make the individual—especially the child—more ready to respond emotionally. But if these and similar factors could be held constant, there would still appear constitutional differences in emotional stability.

A question of psychological significance which has not yet been answered is this: How do individuals differ in their thresholds for specific forms of emotional response?

If we assume that there are various specific emotions—anger, fear, sexual emotion, grief, joy, disgust, etc.—the question takes this form: Do persons who have a low threshold for one kind of emotional disturbance also have a low threshold for the other kinds? To illustrate, if John Smith is easily angered (low threshold for irascibility), is he easily frightened (low fear threshold)? Also are his sexual emotions readily aroused? Does he weep and laugh at slight provocations? Is he easily disgusted?

If we assume that there are only two main forms of emotional upset—pleasant and unpleasant emotions—instead of many, the question of proneness to emotion still arises. We know that individuals differ in the extent to which they smile and laugh. The healthy child at play laughs more than the average adult at work. The man who is slightly intoxicated laughs hilariously at a joke which to his sober companion appears to be quite ordinary. But, under standard conditions, are the persons who are prone to smiling and laughing also prone to the unpleasant type of response when they are painfully stimulated, frustrated, or in conflict?

It is to be regretted that no decisive answer to these questions can be given at the present time.

Tests of "Neurotic Tendency." At the time of the first World War it was recognized as important that soldiers prone to nervous breakdowns be discovered early to prevent them from reaching the front. Under the stress of battle, amid bursting bombs and

the hardships of warfare, some individuals had nervous breakdowns necessitating their removal from the scene of action.

A committee, headed by Professor R. S. Woodworth, devised a check-list of questions which aimed to detect the individuals liable to develop neuroses in warfare. The signing of the armistice prevented the use of Woodworth's test under conditions of actual warfare.

Following the war other tests of "neurotic tendency" were devised. One of the best known is that of L. L. and T. G. Thurstone (1930). The Thurstone inventory, which is presented as a test of personality, consists of a list of 223 questions, each of which is to be answered by the subject with *yes*, *no*, or *doubtful*. For each question, a neurotic and a non-neurotic response has been assumed to exist. For example, to the question, *Do you get stage fright?* the neurotic answer is *yes*; and to the question, *Can you stand criticism without feeling hurt?* the neurotic answer is *no*.

Although the maximal neurotic score would be equal to the number of questions, *i.e.*, to 223, the actual range of scores obtained in one instance from a group of college freshmen was from 5 to 134. A numerically low score on the inventory indicates relative freedom from emotional strain or worry, *i.e.*, an emotionally well-adjusted personality.

A test of this nature is useful in detecting persons who need help with their problems of adjustment and personality. It is, however, something of a shotgun method aimed at general stability of temperament rather than at the diagnosis of specific emotional conflicts. It is a preliminary aid to the psychiatric interview rather than a substitute for it.

The current conception of "neurotic tendency" embraces several fairly distinct psychological meanings. It is related: (1) to nervous excitability and the proneness to emotional behavior, (2) to social maladjustment, and (3) to psychopathic traits or symptoms. Inasmuch as these meanings overlap and are interrelated, there is a great need for further research in this area of "neurotic tendency."

CONCLUSION

Individuals differ widely in emotional stability. There are wide differences in the frequency and intensity of emotional outbreaks

One person has a high ability to resist frustration while another is upset by the slightest mishap. One smiles and laughs readily while another remains serious and sober.

The factors which predispose individuals toward an emotional type of response can be investigated from two points of view. First, it may be assumed that emotional behavior is determined by past experiences; this assumption leads to a genetic analysis. Second, it may be assumed that emotional activity is dependent upon the physical constitution of the organism; this view leads to chemical and physiological analysis.

From the genetic point of view, it is clear that emotional manifestations depend upon the cultural background of the individual, including what he has been trained to like and to dislike. There is evidence, also, that a single emotional crisis may leave an enduring impression upon the subject. A phobia, for example, is a predisposition to respond with fear; it may be based upon a single fright in early childhood followed by repression. Again, a prolonged traumatic experience may produce a nervous breakdown which leaves the individual not only liable to frequent emotional outbreaks but also with other symptoms of neurosis such as tics, amnesias, changes in the diurnal activity cycle, and in pulse and respiration.

From the organic point of view, it is apparent that proneness to emotional disturbance depends upon fatigue, pain, hunger, state of health, the functioning of the ductless glands, diet, and innate constitutional factors. It is clear today that a close relationship exists between temperament and the physicochemical state of the organism, but the details of this relationship are in need of further investigation.

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Note upon experimental neurosis

The work upon experimental neurosis is developing so rapidly that current references will soon be out of date. The best advice to the student is to search recent numbers of the *Psychological Abstracts* for titles dealing with experimental neurosis, audiogenic seizure, convulsion, and related topics.

It would be well to read the original reports of Pavlov (1927, 1928). We have found the papers by Liddell (1938) and Cook (1939) very useful; also the studies by Maier (1939) and Maier and Glaser (1940).

We have relied heavily upon Mowrer's unpublished paper, and we have found help from an unpublished report prepared by the Committee on Problems of Neurotic Behavior, of the Division of Anthropology and Psychology, National Research Council, Washington, D. C., 1938. The title of this report is: *Problems of neurotic behavior, the experimental production and treatment of behavior derangement; appraisal of field and statement of research proposals*.

CHAPTER X

ATTITUDES AND MOTIVES IN RELATION TO EMOTION

Our consideration of the exciting and predisposing causes of emotional disturbance in the last two chapters did not touch upon the specific attitudes and motives which underlie the major forms of emotional upset.

Each emotional disturbance, in a sense, is a unique event depending upon the particular stimulating factors which arouse it. But there are uniformities in emotional behavior which have given rise to such words as *anger*, *fear*, *joy*, *grief*, *disgust*, *excitement*, *embarrassment*, *shame*, and *jealousy*. What attitudes and motives underlie these uniformities? Some of the more important ones, which are basic to the common emotions, will be considered in the present chapter.

SELF-REGARDING ATTITUDES IN RELATION TO FEELING AND EMOTION

An individual appraises himself in relation to others of his group. Although he may not be clearly aware of the psychological process, he comes, in numerous spheres of activity, to behave as if he were superior or inferior to those associated with him. He recognizes himself as holding some social status in each of the groups to which he belongs.

How self-regarding attitudes develop and how they are related to feelings and emotions will be considered in the following sections.

Attitudes of Inferiority and Pride. In the earliest years of life, self-evaluating attitudes begin to be built up which tend to persist through all life. The developing child continually sees and hears himself compared with others: John is bigger and stronger than you. He can fight better. He can knock you down. Harry can run faster. Dick can throw a ball farther. Jim has a finer house, a bigger yard, nicer clothes. Joe's folks drive a Buick car; you have only

a jealousy. Bill's father owns a store, but your father is just a janitor. It goes on and on.

It may be the other way about: *you* are one of the bigger, stronger ones in your group; you can fight better, run faster than others; or you have a bigger house and car, nicer toys and yard equipment. In street fights, on the playground, in the class room, at home, this self-*versus*-other comparison goes on endlessly. The result is that the child makes an evaluation of himself in relation to other children.

Factors of wealth and social standing being approximately equal, the biggest and strongest boy in the group and the prettiest and most resourceful girl are likely to acquire well-developed attitudes of self-confidence and to become leaders. However, the acquirement of special skills or abilities helps to build up positive attitudes of self-regard, even when the former qualities are missing.

If the child happens to have some obvious defect—obesity, short stature, an unsightly birthmark, a crippled limb, deafness—other children make him repeatedly and painfully aware of it. An attitude of inferiority is thus formed which persists indefinitely. The child's attitude of inferiority results from the frustration of a normal social impulse—to belong to a group and to participate in its activities with his share of importance and self-expression.

Alfred Adler pointed out the psychological importance of attitudes of inferiority as factors which regulate the development of personality. Such attitudes are often at the root of persistent non-adjustments. But an inferiority attitude may lead the individual to great achievements. History provides well-known examples of men with defects who, in attempting to compensate for them, have achieved greatly: Demosthenes, with a speech impediment, became an orator; Lord Byron, who had a club foot, wrote immortal poetry; Steinmetz, a cripple, became a wizard of electricity; Kaiser Wilhelm, who had a withered arm, became a military leader.

In less spectacular ways, too, attitudes of inferiority play an important part in human life. A few instances of attitudes of inferiority and pride in college students will be cited from the *Social Psychology* of Lawrence G. Brown (1934).

The first example is that of a girl who, in a so-called *truth session*, was disturbed by remarks about her physical appearance. Note that, even when writing the present account, this young lady is emotion-

ally blocked, as shown by the fact that she refers to "this particular feature" without once telling whether it is her nose, her chin, or some other feature.

When I was a girl in my teens I went on a camping trip. . . . Unfortunately the week chosen for our outing was a disagreeable one. . . . The second day found us sitting on a soaked ground. It had rained continuously. That night in our attempt to forget the penetrating dampness and chill we sat about talking quite frankly. Girls now call them "truth sessions." I couldn't seem to enter into the mutual criticism; in fact, I didn't feel well. One particular girl in the group was unusually pretty and she was not at all backward about criticising others and in a censorious manner. When it came to my turn I was thoroughly gone over. The thing that cut deepest was the stinging remark made by the pretty girl pertaining to one of my features which she described as "horrid." I had hitherto been a carefree happy-go-lucky person, hardly aware of the presence of any of my features so far as looks were concerned. Well, that night I went to bed, for the first time in my life worrying about myself, feeling like asking everybody to forgive me for living. . . . I was sick bodily and mentally. Such was the state of mind I possessed when I fell sick with scarlet fever. I caught it from our chaperon who had been ill a week or so with scarlet rash. Some of the other girls caught cold and developed a scarlet rash, but only two of us were quarantined. I was sick for the next few months. During my illness I frequently raved about my appearance and especially this particular feature. I remember feeling that this feature made up the biggest part of my face. At night the thing possessed me like a devil and I struggled with it. It seemed a gruesome monstrosity. In the daytime I was more submissive, more resigned to the fact that I was hopeless, mentally as well as socially.

When recovering from my illness my mental state certainly did not help me along. It was immaterial to me whether I got well or not. I felt as if I had been ignorantly unaware of my defects, of my shortcomings. How utterly stupid I had been! It seemed like a revelation to me—a revelation of myself. I felt that I was an outcast among the girls. Our doctor told me afterwards that this inferiority complex was due to the fact that my mind readily absorbed and accepted the criticism offered by the girls because the incipient illness and weakened physical condition allowed the impression made to become firmly rooted. My mother, father and our doctor tried to reason with me and to change my depression and pessimistic state of mind.

When starting back to school I hated to meet people. I was as careful as possible to keep several yards distant from my schoolmates when talking to them, thinking my "deformity" would be less noticeable. So sensitive was I that rather than meet people I would cross the street or go down the alleys to avoid them. If ever I caught anyone looking at me I immediately suspected them of making fun of me. Again and again my face felt as if this bad feature comprised the larger part of it. I became aloof, cold, and seemingly indifferent. I would shake my head when called on in class rather than trust myself to

speak. Every situation was painful and embarrassing to me. When people came to our home I ran to my room, and remained there until they went away. Coupled with a proud disposition this awareness of inferiority was a terrible combination. . . .

Before that fateful camping trip I was jolly and carefree. Afterwards I became serious-minded, super-sensitive, pessimistic, unhappy. I was quite another person. All through the rest of my high school days I continued to hold my head high, be aloof, in order to hide my feeling of inferiority. . . . [222-223]

The next illustration shows how an attitude of social inferiority can be based upon poverty and lack of social standing.

The most pronounced definition of myself came to me when I was about ten or eleven years of age. My father was employed in a factory which produced coaches and hearses. It was not a large factory but they made a very sturdy product. My father was a master on a lathe in this shop but earned very small wages. Since our family was large, we lived in considerable poverty.

It was necessary to pass this shop on the way home from school and I often went in and watched dad turn out something on his lathe, but most of all to see the shavings fly. The owner of the factory had a son the same age as me. I went to school and played in the factory with him. We soon became great chums and finally one evening he invited me to his home for dinner.

My mother consented to my going and I dressed in the best clothes I had which were terrible. I had paid little attention heretofore to my chum's clothes or looks, but his to play in were better than my best. When his mother greeted me at the door she was greatly astonished that I was to be the guest that evening for dinner. Her attitude toward me was one of indignation. And to be sure, I looked like a bull in a china shop in her delicate and orderly home.

It was my first experience with anything like this; there I came to realize just who I was. A feeling of inferiority grew on me. I felt how out of place I looked there. I realized my family's poverty and it was brought home to me that I was not of the same class as the people with whom I was dining. I immediately learned my place and no longer played with this old playmate. [241]

The final illustration portrays the development of feelings of pride and superiority. It shows how the level of self-esteem may be raised by comparing one's self with other persons.

When I was in the lower grades of school I developed quite a superiority complex. There were a great many foreign children, mostly Greeks and Hungarians from the lime plant families, attending the small town school which I also attended.

I started to school when I was five years old which fact made me quite

proud of myself and very confident that I was that much more intelligent than the usual run of children. The foreign children in the first grade were much older and larger than the American children.

The foreign children were rather self-conscious, bashful, timid, and backward. They couldn't talk much English, didn't know their A. B. Cs, couldn't count or write or read, and I could do all of these things. I began to wonder why it was that I knew so much more about those things than they did. I looked down upon them and felt sorry for their ignorance.

When a Hungarian boy about ten years old would stand up and try to read and would stumble because he couldn't pronounce a word, I would raise my hand and fairly jump out of my seat to show the teacher that I knew how. I would laugh at him and feel very superior to all those big boys who were so much older and bigger and still didn't know as much as I did.

At recess we would get together and talk and tell about our parents, our homes, and our playthings. Many foreigners lived in small one-room or two-room houses set in rows by the quarry. They would say to me, "Oh, do you live in that big white house?" I would think how envious they must be. I used to go with my father to the lime plant occasionally and then I would go to visit in these shanties. I would act as if it were doing them a great favor to have me enter their homes. I thought how happy they must be to have me come to see them. It seemed to be my delight to tell about "my" house. I think I liked to feel better than other children.

I thought that my father was superior to theirs because he didn't have to work in the quarry. After school at night I would take five or six children into the store with me and line them up in a row, and then give them each a piece of candy. I can still feel my delight and the condescending manner I had when I did this. My father would tell my mother how unselfish I was which made me very proud of myself. But I think that I liked the superior feeling it gave to me.

I imagined that all the children must be jealous of me and that they all would like to be like me. When I came to school with a new dress on I took their compliments as something due to me. When my mother came to visit school I felt so proud, because not many mothers came, as the foreign women couldn't talk English. When my teacher praised me I thought all the children looked at me enviously. [224-225]

Attitudes of inferiority and superiority acquired in the early years play an important part in shaping the whole of one's life. It is important, therefore, to understand how inferiority attitudes and extreme superiority attitudes, like those just presented, can be moulded into patterns more likely to make for success and happiness. Children with inferiority attitudes can be placed in the companionship of less competent children to give them the experience of success and attitudes of self-confidence. Also, they can be helped to acquire new

skills and abilities, to give them a sense of importance among others of their age group. They can also be re-educated to a different set of standards for success, by which standards they find themselves superior to others in their group. Persons with extreme superiority attitudes, too, can be helped to re-evaluate their skills and abilities. Contacts with persons having greater skill and more desirable social and personality traits may help in the process of re-education.

Self-appraisal and the Level of Aspiration. The individual's evaluation of himself plays a major rôle in human behavior. This evaluation rests upon the experiences of success and failure in all areas within which success is of some importance to him. If a man plays an occasional game of tennis for relaxation, a poor score may not especially disturb him, for tennis is only a matter of minor importance to him. He makes no claim of being highly skilled in this area of sport. His neighbor, who competes in the local tennis tournament every year, would feel very inferior if he made the same score. The poor tennis player, however, will certainly have other fields of activity in which success is important to him, within which he strives to gain a sense of success, and to win. Perhaps these areas include golf or music, the maintaining of a beautiful garden, and, most of all, the business and professional competence or the particular skill that is necessary for success in his life work. Whatever it is, if the area is regarded as his own, experiences of success or failure within that area lead him to attitudes of self-confidence or inferiority.

An effective way of protecting one's self-esteem is to shift the area within which one professes competence. The field of competition is often limited on the basis of age or experience. Thus, in a foot race, if a six-year-old boy runs against a nine-year-old and loses, he is less likely to experience a sense of failure than in races with boys of his own age and size.

After a certain amount of experience with an activity, an individual is able to make a fairly accurate appraisal of his own ability. Ordinarily—unless he has a preformed sense of superiority or inferiority—his judgment is moderately close to the actual level of performance. In special skills—reading French, typewriting, shooting at a target, singing, playing badminton or golf—one learns to evaluate his degree of competence and to answer with fair exactness the question, *How good am I in this kind of activity?*

There is a range of proficiency within which an individual knows that his ability lies. On a given test, if the quality of performance is below this range or toward its lower limit, the individual is likely to gain a sense of inferiority from failure. If the quality of performance, on the other hand, approaches or exceeds the upper limit of the proficiency range, he gains an experience of success.

It commonly happens that the individual sets for himself a *level of aspiration*. This goal usually represents a compromise between his own evaluation of his ability and a desire to achieve a high level of performance. If the subject in an experiment is instructed to set a goal for himself, this constitutes a threat to his level of self-esteem. In case he places the goal too high, there is a likelihood of failure and of consequent self-depreciation. The subject, therefore, attempts to meet this threat by manipulating the level of his aspiration to a point somewhere near his ability to achieve, as well as by a determination to perform as well as possible.¹

Awareness of Self in Emotional Processes. The self-evaluative attitudes are aroused in a wide variety of feelings and conscious emotions. The awareness of self, in one form or another, enters as a factor into experiences designated as self-consciousness, embarrassment, timidity, shyness, boldness, shame, the sense of guilt or of innocence, self-assertion, self-abasement, pride in one's self, and the like.

These experiences are so numerous and so complexly interrelated that no attempt will be made here to distinguish among them. Instead, a series of illustrations will be given in which the *self* factor plays a prominent and obviously important part.

Stage fright is the common name for an experience which occurs when a novice is obliged to speak or perform in public. There are some actresses, singers, and public speakers who always suffer some degree of stage fright before every public appearance. The classical account of stage fright, in psychological literature, is that of the Italian physiologist, Mosso (1896), who introduced his book upon *Fear* with these words:

¹ For a review of experiments upon the level of aspiration and references to the literature, the reader is referred to the paper by Frank (1941).

Never shall I forget that evening! From behind the curtains of a glass door I peered into the large amphitheatre crowded with people. It was my first appearance as a lecturer, and most humbly did I repent having undertaken to try my powers in the same hall in which my most celebrated teachers had so often spoken. All I had to do was to communicate the results of some of my investigations into the physiology of sleep, and yet, as the hour drew nearer, stronger waxed within me the fear that I should become confused, lose myself, and finally stand gaping, speechless before my audience. My heart beat violently, its very strings seemed to tighten, and my breath came and went, as when one looks down into a yawning abyss. At last it struck eight. As I cast a last glance at my notes, I became aware, to my horror, that the chain of ideas was broken and the links lost beyond recall. Experiments performed a hundred times, long periods which I had thought myself able to repeat word for word—all seemed forgotten, swept away as though it had never been.

My anguish reached a climax. So great was my perturbation that the recollection of it is dim and shadowy. I remember seeing the usher touch the handle of the door, and that, as he opened it, I seemed to feel a puff of wind in my face; there was a singing in my ears, and then I found myself near a table in the midst of an oppressive silence, as though, after a plunge in a stormy sea, I had raised my head above water and seized hold of a rock in the centre of the vast amphitheatre.

How strange was the sound of my first words! My voice seemed to lose itself in a great wilderness, words, scarce fallen from my lips, to tremble and die away. After a few sentences jerked out almost mechanically, I perceived that I had already finished the introduction of my speech, and discovered with dismay that memory had played me false just at that point where I had thought myself most sure; but there was now no turning back, and so, in great confusion, I proceeded. The hall seemed enveloped in mist. Slowly the cloud began to lift, and here and there in the crowd I could distinguish benevolent, friendly faces, and on these I fixed my gaze, as a man struggling with the waves clings to a floating spar. I could discern, too, the attentive countenances of eager listeners, holding a hand to their ear as though unwilling to lose a single word, and nodding occasionally in token of affirmation. And lastly, I saw myself in this semicircle, alone, humbled, discouraged, dejected—like a sinner at confession. The first greatest emotional disturbance was over; but my throat was parched, my cheeks burned, my breath came in gasps, my voice was strained and trembling. The harmony of the period was often interrupted in the middle by a rapid inspiration, or painfully drawn out, as the chest was compressed to lend force to the last words of a sentence. But to my joy, in spite of all, the ideas began to unfold of their own accord, following each other in regular order along the magic thread to which I blindly clung without a backward glance, and which was to lead me out of the labyrinth. Even the trembling of the hands, which had made me shake the instruments and drawings I had from time to time to exhibit, ceased at last. A heaviness crept over my whole body, the muscles seemed to stiffen, and my knees shook.

Towards the end I felt the blood begin to circulate again. A few minutes passed of which I remember nothing save a great anxiety. My trembling voice had assumed the conclusive tone adopted at the close of a speech. I was perspiring, exhausted, my strength was failing; I glanced at the tiers of seats, and it seemed to me that they were slowly opening in front of me, like the jaws of a monster ready to devour me as soon as the last word should re-echo within its throat. [1-4]

Mosso's stage fright, though unusually intense, is similar in form to other kinds of embarrassment. During the experience of stage fright the performer anticipates failure or humiliation. Even though the audience is interested and sympathetic the emotionally excited speaker anticipates that his talk may not have the desired effect. He has a high level of aspiration. Perhaps he expects too much—to make a "hit" or to be recognized as "brilliant" or "scintillating." Possibly someone is present in the audience who is felt to be secretly resistant or even hostile to the speaker. Experienced speakers avoid stage fright by lowering their level of aspiration somewhat, demanding less of themselves, doing their best and then accepting in a matter-of-fact way whatever acknowledgment there may be.

A variation of this emotional disturbance, made possible by the development of radio broadcasting, is commonly known as "mike fright."

Timidity and Self-consciousness as Forms of Embarrassment. The term *embarrassment* is used broadly to cover a variety of affective disturbances which occur in social situations. Stage fright is only one form of embarrassment. If one has "made a fool of himself in public" or committed some *faux pas*, he is said to be embarrassed. The timid child or self-conscious adolescent is embarrassed in social situations. Feelings of shame, remorse, and guilt, which will be described presently, are feelings of embarrassment. The emotion of embarrassment is always one which arises in a *social* situation.

Everyone has observed the reaction of shyness or timidity in children. A caller enters the living room. The timid child hides behind his mother's skirt or behind some piece of furniture. Perhaps he peeks out cautiously at the visitor. If the guest remains and acts in a friendly manner, this timid behavior gradually disappears. Timid behavior is akin to fear, for it is an unknown and threatening element in the social situation to which he responds by hiding or some other

form of escape. The timid child is said to be "self-conscious." This phrase implies that an awareness of self is a factor in the situation producing shyness.

If a speaker is introduced with flattering words and overstatements, he, too, is made "self-conscious." He blushes in embarrassment. He is "aware of himself." Adverse criticism in front of others produces a similar embarrassment combined, however, with unpleasantness or anger instead of the pleasant self-consciousness resulting from flattery. Self-consciousness, in the literal sense of awareness of one's self, occurs in a wide variety of affective and non-affective experiences.

Shame, Remorse, and the Sense of Guilt. Very different from shyness and stage fright, but still based upon the self-other relationship, are those forms of embarrassment which arise when an individual has carried out some act contrary to the standards of his group or in violation of his personal principles. The terms *shame, remorse, sense of guilt*, and others are used to designate this group of feelings.

Children (as all mothers know) are born without a sense of shame, just as animals are. Before they can experience shame, they must learn what is considered proper and what improper within their social world. The conditions which induce feelings of shame—whether in the child or among primitive people or present-day adults—are variable, depending upon the mores of the group.

The evolution of the bathing suit, through the past two generations, well illustrates changing mores in dress and body exposure—and modified attitudes as to what should induce feelings of shame. Men of today would feel great embarrassment trying to wear the satin knee breeches of George Washington's day or the shawl that Lincoln used to wear about his shoulders.

If it is customary for the women of a tribe to cover the face, a woman feels ashamed when she is discovered without a veil. Among many primitive peoples it is customary for female breasts to be exposed, with no accompanying self-consciousness or feelings of shame; but in cultures which require that the breasts be covered, a feeling of shame is elicited when they are inadvertently exposed. There are savage tribes who wear no clothing at all and who feel no embarrassment over this exposure unless some exponent of Western culture teaches them to wear clothes.

Among the Buka people in Melanesia, there is a feeling of shame

between brother and sister such that they are ashamed to talk to each other unless other people are present; if a man's sister calls to him to come and take some food from her, he will probably pretend not to hear her. Illustrations of situations which elicit shame could be multiplied indefinitely, from both our own and primitive cultures.

Inasmuch as sexual behavior is usually regulated by the mores of the various cultures, thus—through taboos and restrictions—sometimes frustrating a powerful motive, it is not surprising that feelings of guilt and remorse should frequently arise in this area of sexual conduct. The following illustration presents the case of a freshman in an eastern university who, having been taught that autoerotic practices are morally wrong, experienced a sense of guilt over his own autoerotic habits.

John is a boy eighteen years of age. During his fourteenth, fifteenth, and sixteenth years he masturbated habitually. Since then he has indulged in this activity only occasionally. He believes that one who has done "this deed" has degraded himself morally, and that such a person can not succeed or prosper. All of his failures he explains in terms of this belief. He does not make a fraternity; it is because of his habit. He is not liked by young women; the explanation is simple: he has degraded himself. Thus the young man has lived for years in a state of resigned self-condemnation. [222]

Such feelings of guilt are accentuated by the exaggerated statements of misinformed parents and teachers regarding the ill effects of masturbation. There is a common belief that autoerotism is damaging to the sex function, that it causes insanity, or is a sign of moral degradation in the individual practicing it. Pullias (1937), from whose paper the above case study is taken, questioned seventy-five young men regarding their beliefs about autoerotic practices. He found a widespread belief that such practices are damaging. The following figures summarize his findings:

Some type of serious damage	62
Serious physical damage	33
" mental "	28
" moral "	18
" social "	9
Harmful (kind of harm not specified)	6
A direct cause of insanity	12
Not seriously harmful	5
No response	8

The numbers at the right indicate the frequencies of positive response within the group of seventy-five subjects. Since some of the young men stated a belief that masturbation has several effects, the figures overlap and are not meant to be added.¹

Feelings of shame, remorse or guilt are likely to be associated with the violation of taboos and customs. If one accepts the view that it is a virtue to suppress the sexual urge rather than to direct and control it in accordance with social standards, a failure to suppress it is likely to bring a sense of guilt. Discovery in any immoral act is likely to bring shame.

Feelings of shame or guilt arise, of course, in a great variety of non-sexual situations. For example, if a man is caught cheating in an examination or at cards, he feels ashamed of himself. If a boy is seen being cruel to an animal or mean to a young child, he feels guilty. Thieves, murderers, and other types of criminals, suffer from the compunction of a "guilty conscience." There are all gradations in the intensity of these feelings of guilt and remorse.

As a group these feelings are commonly indicated by blushing (vasodilation) and downcast eyes, combined with some attempt to make amends—apologies, explanations, restoration or repair of property, etc.—in an effort to restore one's self to the good graces of a disapproving person or group.

A relatively permanent sense of guilt sometimes develops in the sphere of abnormal behavior. A patient in a psychopathic hospital, for example, was convinced that he had committed the "unpardonable sin." The exact nature of this sin was very vague to him. Nevertheless, he appeared to be experiencing a profound sense of guilt and self-reproach. With head bowed and a despondent countenance he rocked back and forth in his chair, repeating over and over: "All the evil in the world I have done. I am responsible for all the sin and trouble in the world. I am to blame for it all. . . ." This patient was

¹ The notion that autoerotic practices lead to insanity is definitely incorrect. There is, however, a danger of sexual excess and of developing solitary sexual habits which will later interfere with the satisfaction of the heterosexual relationship. Still, it should be understood that more harm results from severe mental conflict, from anxiety and remorse over violating one's moral and religious code with its consequent lowering of self-esteem, than from any direct physical consequences of the practice. Autoerotism is known to be quite frequent in situations offering no other forms of sexual satisfaction.

An excellent treatment of the problem of masturbation and of other sexual problems from the standpoint of mental hygiene can be found in McKinney (1941). See also Landis and associates (1940).

in a pathological state of conflict from which he suffered a profound sense of guilt and remorse.

LOVE-HATE ATTITUDES AND THE SEXUAL APPETITE

The term *love* is commonly used in a broad sense to designate any attitude of liking for a person, object, situation or activity. Thus, a man is said to *love* his home, his work, his religion, even his smoking jacket and slippers, or his fishing tackle. All of us have heard about the small boy who, when asked to distinguish between *liking* and *loving* replied: "I *like* my mother but I *love* ice cream."

A genuine love attitude, in contrast with these attitudes of liking, is a more deep-seated and lasting affective state. It is an attitude of one individual toward another. Love attitudes are both sexual and non-sexual.

The non-sexual forms of love attitude include love of parents for children and of children for parents; love of brothers and sisters for each other; love of friends; love of mankind. The attitude toward a long-cherished pet is sometimes a real love attitude, too. Non-sexual love attitudes are based upon a somewhat different set of factors for each relationship, but in all there is a basis of giving and receiving acts of kindness, helpfulness, and generosity. This is especially well illustrated in the care and feeding of an infant by its mother, with all the intimate physical contacts entailed in nursing, bathing, dressing, and other care. Caressing and fondling figure largely in establishing the love attitude between both father or mother and the child. A sharing of play is often an important factor in developing the mother-child or father-child love attitude, too.

Between brothers and sisters all the above factors play a part in producing the love attitude. As the children grow older, there is a sharing of more serious interests and activities as well. In the development of non-sexual love attitudes between friends, all the factors mentioned here may play a part; but the sharing of activities and mutual interests is usually the strongest bond. Such friendships, if they happen to be between members of the opposite sex, may change, as everybody knows, in character and become love attitudes; in other words, the two may "fall in love."

In sexual love attitudes the affectionate behavior of an individual is directed toward a member of the opposite sex. Commonly the

relationship is a reciprocal one, each of the pair revealing, in his behavior, his love for the other. All the factors mentioned above as bases of non-sexual love may be factors also in sexual love, but here, caressing, kissing, and similar affectionate demonstrations play a more important rôle than in the other type. The basis of sexual love is "physical and mental attractiveness," *i.e.*, the arousal of the sexual appetite, and its ultimate consummation if carried to a normal biological conclusion, is the sexual act.

The attitude opposed to love is that of hate. Hate attitudes may be based upon either sexual or non-sexual frustrations. If a husband or a wife is unsatisfied sexually, there may develop gradually an attitude of bitterness or hatred toward the mate. In some cases there develops a bivalent attitude—one in which love and hate alternate. To remove such unfortunate attitudes, the frustration must first be relieved.

The frustration of any strong motive, sexual or non-sexual, is likely to leave an attitude of hate. In contrast with sexual frustration as a basis for hate attitudes is the case of the military ruler of a city who treats the citizens cruelly or in an overbearing manner, frustrating in his people various desires for independent action and for security. The citizens will come to hate him, *i.e.*, develop attitudes of intense dislike and antagonism based upon their frustrations.

The term *hate* is commonly used in as broad a sense as *love*. It is used, roughly, as the equivalent of *dislike*. Thus, a child may say, "I *hate* castor oil."

In the following sections we shall see how love attitudes and the sexual appetite enter into feelings and emotions as determining factors. We shall start with the experiences designated by the term *jealousy*.

Jealousy. Jealousy is a complex affective disturbance in which there are tendencies to attack the intruder who threatens to win away one's love object. Jealousy may be based upon non-sexual or sexual motives. The non-sexual type occurs in children, among adolescent chums, and in other non-sexual relationships. Sexually based jealousy is present in the triangular love situations of adults.

A typical situation in which jealous behavior appears is that produced by the arrival of a new baby in the family. The attention, care, and affectionate demonstrations of the mother are now diverted from

the older child to the newcomer. The jealous child responds by making an attack upon the baby.

Jealous behavior will be illustrated by citing the case of Joseph Wright, a six-year-old boy, described by Foster (1927):

He was born while his father was overseas during the first World War. At that time the mother made her home with relatives. She frankly admits that she showered affection and caresses on the baby, filling her life with the baby's needs in order not to think about the possible fate of his father. When the baby was a year old the father returned. Upon entering the home he greeted the mother demonstratively, paying no attention at the moment to Joseph. The baby showed a temper which could not at once be quieted. For a long time after this he resented the affectionate attention which was shown to his mother by the father. Noting this, both parents adopted the practice of including him in their demonstrations of affection. When another son was born, Joseph again showed marked jealousy and on several occasions tried to injure him, once throwing a steel tool from the automobile kit at him. To overcome this the parents tried to see that both boys shared alike in everything. But at the present time, if Richard is ill and receives special attention, Joseph produces a cough or some other symptom that brings him attention also. [75]

In such situations the first child has come to accept the attention, care, and affection of the mother as his due. An "intruder" who disturbs this relationship is attacked as if he were a love-thief. The attack is a hostile one produced by the love frustration. Generally speaking, jealousies of this type need not become so serious as this one did, if the parents realize how difficult an adjustment the older child is having to make, and are careful to include him, so far as practicable, when caressing or caring for the new baby.

When the object of desire is someone else's property or honor or position, rather than the love or affectionate care of some other person, the terms *envy* and *covetousness* are more appropriate. For example, a man would like to own the beautiful new automobile in which Mr. Neighbor rides. His wife desires a fur coat as elegant as the new one Mrs. Neighbor is wearing. Their child desires the bicycle which Jimmy Neighbor is riding. Psychologically, envy and jealousy are very similar, as in both there is a desire for something not quite one's own; but *envy* is easily distinguishable from jealousy, since, with the latter, the object of desire is the love or affectionate care of some person rather than property or status.

Another form of jealousy is *sexual jealousy*, which rests upon the

definite arousal of the sexual appetite, followed by a threat of losing the loved one to a rival. This form of emotion will be described in the following section.

Frustration and Satisfaction of the Sexual Appetite in Relation to Emotion. The analysis of sexual appetite is a problem of motivation, but the main biological facts of sexual appetite must be considered here in order to get an adequate understanding of sexual emotion.

The sexual appetite of a female animal waxes and wanes; it reveals a definite cycle. During the period of estrus, or heat, the female is receptive to advances of the male; at other times she is indifferent to him and may fight him off if he attempts to copulate. The strength of the female sexual drive, when measured in the laboratory, is found to increase and decrease periodically, in a manner corresponding to the variations in the sexual appetite in real life. The complete sequence is known as the estrous or estral cycle.

The male animal, in contrast, lacks an estrous cycle. Most of the time he can be aroused sexually by the enticing behavior of a female in heat. The strength of drive in the male depends upon the duration of sexual deprivation as well as upon the presence of a receptive female.

If a receptive mate is at hand, the sexual appetite in animals leads normally to copulation, which act may start a reproductive sequence: impregnation, gestation, birth of young, nursing, growth of the young animals to the point of sexual maturity.

One of the ways in which human sexual behavior differs from that of animals is that there is no typical estrous cycle. There is, however, a relation between strength of sexual desire and the menstrual cycle—the desire is frequently most intense immediately before the menses. But the sexual urge in the human female, under favorable circumstances, is more uniformly and continuously present than it is with female animals. Also, civilized man is constantly bombarded by sexually exciting stimulations in the form of magazine stories, novels, advertisements, radio and screen programs. They all tend to heighten the sexual urge.

There are many cultural factors controlling and directing sexual behavior in human beings which are non-existent in the sexual behavior of animals. In man, a romantic attachment for the mate—a love

attitude—enhances the pleasure of the sexual union. Esthetic considerations, too, often enhance or detract from sexual satisfaction in man. Mutual consideration, on the part of the two individuals, for each other's happiness, influences their sex behavior. Memories of the past, consideration for the future, imagination, all influence human sexual behavior, distinguishing it from that of animals.

Sexual appetite is the basis of various forms of sexual emotion. There are, in general, three main kinds of sexual emotion: those in which the sexual appetite is aroused to such an extent that it is moderately disturbing to the individual; those in which an intense sexual drive is definitely frustrated, causing a conflict to arise; and those in which the appetite is satisfied by consummatory sex behavior. We shall consider here the emotions of frustration and of satisfaction of the sexual appetite.

The emotions which rest upon frustration of the sexual drive vary in form according to the circumstances which do the thwarting as well as according to the degree of frustration. To illustrate the emotions of sexual frustration, three kinds of thwarting will be described, along with the corresponding emotions.

1. *Sexual jealousy*, as we observe it among animals, is definitely related to the hostile attack of an intruder. During the mating season, two males will sometimes get into a fight for possession of a female. According to the Darwinian theory, the antlers of the deer, the spurs of the rooster, and the superior strength and size of the male have been developed in the vital struggle for mates. The strongest and most fit leave offspring; the others are eliminated. Thus sexual selection goes on in nature.

There is, however, a gentler, more esthetic side to sexual selection: The beautiful plumage of the peacock and the male pheasant and of many other male birds has been evolved to charm or entice the female. The female, it appears, selects the most beautiful and charming male, who in turn becomes the father of an oncoming generation. Through this kind of selective mating, a type of male which is increasingly attractive to the female of the species has been gradually evolved.

Returning now to the consideration of jealousy, it may be noted that human jealousy is akin to its crude biological counterpart. When a rival intrudes and threatens to take possession of the loved individ-

ual, the jealous person is caught between two impulses: to make renewed love advances to the loved person and to attack the intruder. In some cultures the jealous man may challenge his rival to a duel or to a fist fight, or even plunge a knife into his back.

In modern polite society open attack upon the rival is taboo. Consequently the thwarted individual may substitute slanderous or depreciating remarks; he may maneuver his competitor into appearing disadvantageously before the fair object of their love; or in more subtle ways he may reveal an attitude of hostility toward the rival lover.

The persistently jealous person is in a continuous state of conflict. As we have pointed out, there is a conflict between the impulses of hostile attack and love advance. And there is, further, a conflict between these impulses and powerful social taboos which prohibit both open attack and open love-making. Finally, if the loved one wavers in her attitude of loyalty, there arises a state of anxiety lest she be lost.

How can a jealous person resolve his conflicts? If he is overtimid and has a rival bolder than himself, perhaps he needs to make more definite, forceful love advances. At any rate, he needs to discover just what his status is with respect to the loved person. Either this will reassure him that jealous feelings are uncalled for or he will find himself a rejected lover. In the latter case, he can end his conflict, not by grieving over his loss, but by choosing another more constant love object.

2. In *bereavement* the mate is lost through death or by permanent separation. The death of a mate blocks habitual forms of sexual satisfaction, but the grief of the widowed person has a far broader basis than sexual frustration alone. The bereavement involves loss of the interchange of affection and companionship, loss of someone to talk to, to share work and play with, to perform personal services for, to receive help of various kinds from, and so on.

If the deceased is of some other relationship than mate—child or parent, for instance—the grief is free from the augmenting factor of sexual frustration. But, assuming the relationship with the deceased spouse to have been, besides other things, a source of sexual satisfaction, the bereavement includes, along with all the other losses mentioned above, a frustration of the sexual urge. This sexual frustra-

tion may be felt later on more than during the first crushing grief of the bereavement period.

The more highly cherished the mate and the more sudden and complete the loss, the greater is the resulting emotional upset. In bereavement the emotional disorganization is sometimes so severe and so permanent that the subject goes into a neurotic condition. One such instance, drawn from the cases collected by Lawrence G. Brown (1934), is presented here.

As time went on, Mary and I became very much in love with each other. By the time the next September rolled around we were thinking of our future. We decided it would be a good thing for me to spend a few years in college to prepare me better for providing for our future happiness. She promised faithfully to wait for me until I was finished with my education and I did the same for her. When the time came, I entered college.

The first year was great. I went home every week-end to see her and everything was going along smoothly. We were certain of our love. We would sit by the hour planning and dreaming of our future home. I can still remember it very vividly, even so far as to the placing of the furniture. We delighted in having petty arguments over where a certain chair would be put and who would have a certain room. We often remarked in a joking way that our happiness was too perfect to last. We were both in paradise. Then, suddenly, like a flash the blow came. One day I noticed that she was looking ill. I asked her what the trouble was but she said she felt all right. I was not satisfied with this, so I took her to a doctor. The doctor said she had sugar diabetes, but not serious. She was under the doctor's care and we both thought that she was getting along fine. She picked up in weight and was looking much better. We did not go anywhere and were cautious in every move. One Sunday night she wanted to go to a dance; I did not want to go on account of her condition but she argued that she was all right now, so I took her word for it and we went to the dance. We had a wonderful time. When I left her that night she was full of pep and seemed the good old Mary. The next morning I was called by her mother; she told me that Mary was very ill and I should come right over. I went directly to her home and found her in her bed unconscious. She had lost consciousness some time during the night and was found by her mother in that state. I was at her side constantly, but was not able to help her. I just sat there and prayed that she might pull through. The doctors did all they could, but to no avail. Wednesday morning she died, never regaining consciousness. I was in the room when she passed away. I damn near went mad watching, staring at her, seeing her slip farther away—and I was helpless. The room—I shall never forget it. Her father and mother, the doctor and myself watching her draw her last breath. We were like stone. My hands clenched so hard that the finger nails went into the palm of my hand. She turned black, first her legs, then her arms; then she was black all over. I could see death taking her away from me. Words

fail me when I attempt to describe it. When the doctor pulled the sheet over her head I passed out. I was like a mad man for over a week. Locked myself up in my room allowing no one to enter except my mother to bring food. They did not let me go to the funeral, I was in such bad shape. In my sleep I could see the accusing finger pointing to me and saying 'You are guilty. You killed her.' Mother tried to console me, but it could not be done. I thought of suicide. Oh! I thought of everything trying to forget. In my sleep I would dream about her alive and happy, then her ghastly dead face would loom up. I would wake up screaming and sweating like a lunatic. Finally I became strong enough to go out. The first thing I got was a quart of whiskey. I got drunk and went back to the bootlegger's place and stayed there that night. Drunk all night. I went home the next morning and I could see on my mother's face the night she had spent. That started everything. I did not draw a sober breath into my body for three weeks. Finally they called a doctor and I was given shots to put me to sleep. When I gained consciousness I felt that I wanted to die. The doctor explained to me that it was not my fault that Mary had died. This eased my mind slightly. . . . [300-301]

3. A happier form of sexual frustration is that found in *romantic love*. The lover wants to be near the object of his love, to touch her hair, to dance with her, to hold hands, embrace, and caress. All such demonstrations of affection heighten the level of sexual excitement.

The biological completion of love-making is the sexual union. In our own and related cultures, sexual union outside of wedlock is definitely forbidden. This taboo is based upon a number of considerations, chief of which is the chance that impregnation may occur and a child be born without a legal father, suitable home conditions for its rearing, and the sanction of society. Young people are deterred from sexual promiscuity by the knowledge of this danger and by the further fear that they might suffer social ostracism if their irregular behavior were discovered. Thus, young lovers are inhibited from giving expression to a biological urge by factors derived directly from the social environment: moral and religious teachings, fear of social ostracism, fear of pregnancy, fear of venereal diseases, and possibly other considerations which combine to make a sex-inhibitory attitude.

Consequently, in romantic love the lovers are at once aroused and inhibited sexually. This state of conflict evokes the disturbing emotion known as "being in love," which is felt by the two individuals. The more strongly an individual is excited by sexual stimulation and the more completely this biological urge is frustrated, the greater will be his emotional disturbance.

"Being in love" is thus a conflict state within the individual which lasts for an indefinite period. Mutual caresses arouse the lovers; inhibitory factors prevent them from giving their love its fullest expression. A state of emotional tension is built up which may be very intense. When the lovers are separated, they are held by attitudes of love and loyalty to each other.

Various factors may complicate the conflict of romantic love. Sometimes one of the lovers has doubts as to the fidelity of the partner, and knowledge or suspicion that there is a rival introduces an element of jealousy. Sometimes signs of disinterest on the part of one make the outcome of the romantic relationship uncertain and increase the anxiety of the other.

Usually the ego of both is strongly involved. Each of the two lovers identifies himself with the other and becomes proverbially blind to his loved one's defects. Further, failure in love is taken as a personal defeat; it brings a lowering of the level of self-esteem.

The disturbing conflicts evoked by "being in love" are normally resolved by marriage or else by a final separation of the two. Before marriage, there are various methods by which the emotional disturbance of the lovers can be reduced. Limiting the amount of physical stimulation through caressing; sharing a variety of enjoyable activities which divert attention from the physical expressions of love; becoming absorbed in making plans for their future life together; these are effective ways of letting down emotional tension and partially resolving the conflicts of "being in love."

Quite distinct from the emotional states which are produced by frustration of the sexual drive are those emotions which occur when the appetite is satisfied.

The sexual appetite of both sexes, when not inhibited in any way, usually leads to sexual union. During the preliminary stages of this union the appetite increases, the level of sexual excitement steadily rising until reflex ejaculation occurs in the male and a response which is physiologically equivalent occurs in the female. These climaxes of the sex act mark an end of sexual appetite, for the time being, through its satisfaction.

Such a complete release of organic tension normally brings satisfaction of the sexual appetite. It is known as the sexual orgasm. In

the male the orgasm is experienced at the time of the ejaculation reflex; and in the female there are involuntary contractions of reproductive organs. The steadily increasing excitement during the early stage of coitus is not to be confused with the orgasm itself. The danger of such confusion has been found to be much greater in women than in men, probably because in women the climax is reached more slowly and sometimes the orgasm does not occur.

From the standpoint of affective experience the sexual act in human beings is definitely pleasurable. This fact insures the carrying on of the species. The relaxed, contented mood which persists after sexual intercourse is called *analepsis*. If the orgasm is incomplete, *analepsis* does not follow. This is rarely the case with the male but happens not infrequently with women. Instead of sexual satisfaction, followed by relaxation, there remains a state of nervous excitement and tension. If this happens repeatedly, the wife may develop an attitude of resentment and bitterness toward her husband, though rationalization or modesty usually prevents the couple from assigning it as the source of their maladjustment and of divorce.¹

What Is a Sexual Emotion? Our introductory definition in Chapter I stated three criteria which must be satisfied simultaneously for a process to be defined as an emotion (page 51). In the light of these criteria the question may be raised as to whether or not the sexual union arouses an emotion. Sexual intercourse is persistent purposive behavior. Frustrating it or satisfying the appetite gives the emotion.

One of the criteria of emotion is the presence of bodily changes in the glands and smooth muscles. There is plenty of evidence that circulatory, respiratory, and glandular changes occur during the sexual act. The bodily changes are produced through both the sacral and the sympathetic divisions of the autonomic nervous system.

Another criterion of emotion is the existence of a psychological origin of the disturbed state. It may safely be assumed that normal heterosexual behavior originates in the psychological situation rather than from the tissue conditions alone. In so far as the presence of the

¹ To avoid this unfortunate occurrence both partners should enter marriage with the understanding that the sexual adjustment of two individuals is gradually achieved, as any other art is gradually mastered. They should inform themselves concerning the physiological and psychological facts of sex. Correct attitudes derived from a truthful and matter of fact form of sex education go far in aiding marital adjustment.

mate instigates the activity, the origin is definitely external to the individual experiencing the emotion.

As the main criterion we have held that every emotion is a disturbed or upset state of the individual. Viewed in the light of this criterion, the culmination of the sexual act arouses an emotion to the extent that the individual is disturbed by it or during it. Coitus is frequently a disturbed state, an emotional experience. On the other hand, the sexual act may be thoroughly habituated and automatic in nature, running to its normal conclusion with very little disturbance. The male reflex of ejaculation and the female equivalent are objectively similar to other reflexive patterns of response. Subjectively considered, however, the male ejaculation differs from other reflexive patterns in that there is a highly pleasurable experience associated with it.

In view of the above considerations, it may be concluded that the sexual act usually, but not necessarily, arouses an emotion.

In any event, the sexual experience is definitely an affective one. Under normal conditions of well-adjusted marriage, all stages of coitus are subjectively pleasing. And when the sexual motive is frustrated the experience is definitely an unpleasant one.

In defining sexual emotions, it is well to distinguish them from sexual attitudes and motives and from moods. As we have seen, sexual *emotions* are disturbed states which depend upon the presence of motives. There are two main varieties of sexual emotions: those that depend upon the frustration of sexual motivation and those that depend upon a release of tension through its satisfaction. The sexual *motives* are energy-liberating factors which initiate behavior. The sexual *attitudes* are relatively permanent predispositions of love and hate which develop gradually on the basis of previous satisfactions and dissatisfactions in the erotic sphere. Sexual *moods* are persistent conscious experiences which have an erotic basis. These moods are of two main kinds: the pleasant, relaxed mood of analepsis and the unpleasant mood of tension and restlessness which follows an incomplete sexual act.

The term *love* is used in many senses. It may refer to an attitude (love attitude), or to a state of conflict (romantic love), or to a motive (sexual appetite). It is sometimes used to designate a mood or an emotion. In any event, the term needs to be clearly defined if used by the psychologist.

FEAR ATTITUDES AND RELATED AFFECTIVE PROCESSES

Some of the terms which designate fear refer to affective processes; others to underlying conditions. The term *fear* is ambiguous when used as a name for an affective process. Bayley (1928) suggested that there are two main kinds of fear. The first is an innate startle response which is induced by loud sounds, by shocks and jars to the body, by unexpected falls, and possibly by sudden visible movements. The second kind of fear is a more general bodily disturbance which depends upon an incomplete understanding or inadequate control of a situation accepted by the subject as dangerous or threatening.

Bayley's distinction is sound so far as it goes. But in addition to the innate startle response there are other simple protective reflexes which might equally well be designated by the term *fear*. Some of these are: simple pain-avoidance reflexes, like winking the eye to avoid a foreign object and withdrawing the finger from the fire; the closing of the clam shell as protection against injury; autotomy in the starfish. These *patterns*, obviously, cannot be called fear patterns since, as previously pointed out, no pattern of response is an emotion. Patterns of response should be studied for their own sake and not as emotions.

What Bayley refers to as the "second kind of fear" is a partial definition of fear itself. In referring to the environmental situation as the means for recognizing fear, she gives the basis for differentiating it from other emotions. For an adequate definition of fear, the "general disturbance" to which Bayley refers must be understood to include behavioral manifestations and internal bodily changes and the conscious experience of fear as well. The bodily changes which occur when a man is confronted with danger are so complex and widespread that no characteristic fear pattern can be identified—much less can such a pattern be used to distinguish fear from other forms of excited emotion.

From the standpoint of intensity, there are all gradations of fear from the weakest apprehensiveness to the severest disruptive terror.

Related to authentic fear responses are *phobias* and states of *anxiety*. A phobia is a predisposition to respond with intense fear to a particular kind of object or situation. As we have seen, a phobia is based upon a traumatic experience in which there was a sense of guilt or other unpleasantness followed by repression of the unpleasant experience.

The term *anxiety* designates a persistent state in which there is a foreboding of evil. It is a dread of illness, disgrace, or harm of any sort whatever to one's self or another. Usually the subject can find some ground or basis for his anxiety, but at times it takes the form of a chronic anxiety about no specific thing (pages 389-390).

The above terms (*anxiety*, *phobia*, and authentic *fear*) refer mainly to a group of closely related affective processes which may be included under the general category of *fear*.

One reason why fear responses are psychologically important is because they leave the subject with *fear attitudes*. The fear attitudes are built into the organization of the psychological individual. They predispose him to respond negatively against certain objects and situations which he takes as signals of danger. These predispositions to fear responses may last throughout life.

In the following sections we shall inquire about fear attitudes and the affective processes related to them. We shall start with the questions: What makes us afraid? What are some of the signals of danger which induce fear?

What Makes Us Afraid? There are a good many observations and experiments which bear upon the question. It is our purpose here to present some of the pertinent facts.

According to Watson, the innate fear responses of the infant are elicited by two main kinds of stimulation: (1) *mechanical disturbances*, such as the sudden removal of support or an unexpected jar or push, and (2) *loud sounds*, such as those produced by striking a metal bar near the infant. This view has been criticized on the ground that it is not merely the loudness but also the *suddenness* and possibly the *character* of the sound which induces fear. Further, visible *movement* may arouse fear, especially when it comes suddenly and unexpectedly (pages 171-172).

That *sudden movement* is a cause of fear in young children was reported by H. E. and M. C. Jones (1928). They studied the reactions of preschool children to flashlights, darkness, false faces, snakes, rabbits, frogs, and the like. The animal which most frequently caused fear was the frog. It was not usually the first sight of the frog but a sudden jump of the animal which caused the response. Likewise, a child was often afraid of a jack-in-the-box. A species of beetle which suddenly snaps into the air when placed on its back was found to be

quite alarming. On the other hand, slowly moving caterpillars and earthworms aroused little or no fear in young children.

Fear arises, H. E. and M. C. Jones conclude, when the individual knows just enough about something perceived to suspect a potential danger in the stimulus-situation, but when he has not advanced to the point of complete understanding and control. A rustling sound, a flashing light, a moving shadow, when not clearly understood, arouse fear. Mysterious, uncanny situations, which combine the familiar with the unfamiliar, may suggest lurking danger or destruction.

English (1929) argued that it is the *uncanniness* of a situation which arouses fear. He referred to Köhler's apes which showed fear when confronted with a strange mask or with a model of oxen, and to Romanes' dog which was frightened when his master's hat was actuated by an invisible string. These animals showed fear at strange, uncanny sights.

A *sudden, unexpected fall* through space, as Watson pointed out, arouses fear. This cause of fear will be illustrated by reference to an experiment by Blatz (1925).

Blatz aroused genuine fear in the laboratory. He employed a trick chair which without any warning could be dropped backward through an arc of about sixty degrees. To prevent injury to the subject the fall was broken by means of a strong door check. Such loss of support usually induced a marked emotional upset in the subject, with cardiac palpitation, irregular breathing, increased sweat secretion, and other bodily changes of strong emotion. The cardiac and respiratory changes and changes of electrical resistance due to secretion of sweat glands were photographically recorded and the records analyzed.

Twenty-one persons served as subjects; from them 280 separate records were obtained.

The experimental results reveal the importance of *surprise* as an element in the causation of fear. When the subjects were wholly unsuspecting and did not understand the true purpose of the experiment, the emotional response, as shown by the records, was the most pronounced. At the start the subjects were allowed to become habituated to sitting in the chair, without having a fall. After the first fall, however, they anticipated another.

Habituation to the falling-chair apparatus and anticipation of another fall reduced the bodily effects both in duration and in degree. But whenever the loss of support came unexpectedly and without warning the bodily disturbance was similar to that of the initial fall, despite habituation to the apparatus and the definite knowledge that sooner or later another fall would occur.

A source of fear which is different from those mentioned above is the *awareness of danger*, whether real or imaginary. If, for example, a man sees a dark, funnel-shaped cloud approaching, he becomes fearful and runs for safety. If a small child sees the same cloud and does not understand what it portends, he remains unafraid. Because he lacks the background of knowledge necessary for an *awareness of danger*, he does not experience fear.

A sense of danger is aroused by a great variety of situations which threaten (or are believed to threaten) pain, injury, death, humiliation, or some other evil. In some cases the impending danger is directly perceived. In many others, memory of past experiences, and imagination, by influencing the interpretation of observed facts, play an important rôle in arousing fear. For example, a woman who had recovered, a month earlier, from a painful and serious throat infection had an awareness of danger, with signs of fear, when her throat again began to be sore with what proved, this time, to be only a mild cold.

What Are the Signals of Danger? In an early study G. Stanley Hall (1897) determined the main source of fear within a group composed of 500 boys and 600 girls. The girls reported a total of 1765 "well-described fears" and the boys a total of 1116. The sources of fear were classified, with the result shown in Table 9. Our chief interest in the table lies in the relative frequency of the different danger signals mentioned by the children.

In a more recent study Jersild, Markey, and Jersild (1933) interviewed 400 children about their fears. The group was composed of twenty-five boys and twenty-five girls in each age group of five to twelve years, inclusive. The instructions were these: "*Tell me about things that scare you, things that frighten you. Tell me what makes you afraid. Tell me more about that. What else makes you afraid? What else scares you? What else? What else?*"

TABLE 9
SOURCES OF FEAR IN CHILDREN
(After G. Stanley Hall)

	GIRLS	BOYS
Thunder and lightning	230	155
Persons	190	129
Reptiles	180	123
Darkness	171	130
Death	102	74
Domestic animals	96	57
Rats and mice	75	13
Insects	74	52
Ghosts	72	44
Wind	61	35
End of world	53	11
Water	53	62
Robbers	48	32
Mechanism	47	31
Blood	44	14
Heights	40	43
Self-consciousness	40	28
Noises	36	10
Buried alive	32	5
Imaginary things	24	23
Drowning	20	19
Clouds	15	4
Solitude	15	4
Places	14	2
Meteors	12	6
Shyness	8	9
Fairies	7	0
Ridicule	6	1
Totals	1765	1116

A few of the children tried to hedge in their answers to this questioning, but most of them came directly to the point.

After the questioning had been completed, the sources of fear were classified by the investigators. To illustrate, all particular animals which were mentioned as sources of fear were classified under the heading "animals." In Table 10 only the first-mentioned sources of fear are considered. The source of fear first mentioned by each child was assumed to be one which was definite and certain.

The four columns in the table show the percentage distribution of the various fear objects for each of four age groups. Since there were 100 children in each of the four age groups, the percentages are comparable and can be used to trace differences which depend upon age.

TABLE 10
SOURCES OF FEAR
(After Jersild, Markey, and Jersild)

Type of fear object	Age groups			
	5-6	7-8	9-10	11-12
Bodily injury and physical danger	5.1	4.0	14.0	15.2
Animals	27.3	22.0	11.0	11.1
Bad people, robber, kidnaper, etc.	12.1	6.0	6.0	5.1
Supernatural, mysterious	20.2	26.0	18.0	20.2
The dark, being alone, strange sights, deformities	11.1	11.0	14.0	20.2
Nightmares, apparitions	6.1	15.0	8.0	6.1
Scolding, guilt, failure	0.0	0.0	4.0	4.0
Illness, injury, death of relative	0.0	1.0	3.0	3.0
Startling events and noises	1.0	4.0	3.0	3.0
Frightening gestures with noises, tales	5.7	7.0	10.0	5.1
Scary games	1.0	0.0	2.0	0.0
All other sources	10.4	4.0	7.0	7.0

The older children show a relatively greater fear of bodily injury and physical danger. The older children likewise show more fear of uncanny and strange circumstances such as the dark, being left alone, lights and shadows, deformities. Other fear objects reported more frequently by older than by younger children are: fear of scoldings and reprimands which give a sense of guilt or failure; fear that relatives might become sick or die; fear of startling events such as thunder and lightning; fear of sudden noises. Younger children show fear of animals much more frequently than do older ones. Younger children also report more fear of bad characters such as robbers and kidnappers. No outstanding sex differences were discovered, nor were the differences found to be significantly related to intelligence quotients.

In appraising studies of this type, one must assume that the results are relative to the culture within which the study was made. A gen-

eral validity of the finding, which is independent of place and time, cannot be taken for granted, especially in view of the fact that children are taught what to fear and what not to fear.

Development of Fear Attitudes. The questionnaire study of Jersild, Markey, and Jersild demonstrates the existence of developmental changes in the fear attitudes of children. The kind of situation which arouses fear in the child is not fixed but changes from year to year.

A further illustration of this principle is found in an observational study of H. E. and M. C. Jones (1928). These investigators presented each subject with a live snake and observed his response to it. The test was made with a group of fifty-one children and ninety adults.

It was found that up to the age of two years children showed no fear of snakes. At three to three and a half there was commonly a cautious response to the reptile. At this age the children paid close attention to the snake's movements but were somewhat on their guard in approaching it. The definite fear of snakes was more frequently observed in children beyond the age of four than in those younger than this age. Adults revealed a more pronounced fear of snakes than did children. Tests with college students indicated that they were more frequently afraid of snakes than were small children. Incidentally, no sex differences were found in these tests with live snakes.

Considering the evidence, we must conclude that attitudes of fear toward snakes develop progressively in the child from year to year—at least in our own culture.

Anxiety. A fear attitude, such as the fear of snakes, may be latent for years. It appears only on those rare occasions when the individual meets a snake and reveals that he has a fear attitude. The same is true of a phobia. A phobia is called out by specific objects and situations and may be latent for long periods of time.

Worry or anxiety, however, is different from fears and phobias, in that it is a more persistent state, a chronic foreboding of evil or harm. The anxious individual is tensely set for pain or injury, illness, death, disgrace, or humiliation to be visited upon himself or some other person. He usually recognizes fairly definitely the source of the impending misfortune over which he worries. This is not always true, however, for anxiety sometimes takes the form of a chronic appre-

hensiveness about no specific thing. Sometimes, instead of there being no definite anxiety object, the individual in this state worries over a whole succession of different things, some of which actually offer real grounds for worry.

Anxiety is medically important because it is known that symptoms of physical illness rest upon persistent worries. For example, the symptoms of exophthalmic goiter, or Graves' disease, sometimes appear directly after a severe shock or some long-drawn-out and worrisome strain.

The surgeon Crile (1915) described the case of a broker who was in excellent health until, in the panic of 1907, his fortune and those of many others were in jeopardy for almost a year. He finally failed in business. During the heavy strain, with its constant anxiety, he became increasingly nervous. Gradually he developed a pulsating enlargement of the thyroid gland, an increased prominence of the eyes, marked increase in perspiration, palpitation of the heart, more rapid respiration with frequent sighing, and increased blood pressure. There were tremors in the fingers and in other muscle groups, a rapid loss of weight and strength, frequent gastrointestinal disturbances, and a loss of normal control of his impulses to act. He was broken in health as completely as in fortune. His symptoms were those of exophthalmic goiter. They resembled closely the bodily signs of fear, and actually they followed in the wake of an intense anxiety.

Whatever the primary exciting cause of exophthalmic goiter may be, whether a chronic focus of infection, a tumor growth, or some other factor the medical profession may have determined, it is certain that an unusual business worry, disappointment in love, bereavement, the prolonged illness of a loved one—any shock or persistent anxiety—may markedly exacerbate the symptoms and in some cases appear to be an exciting etiologic factor of the disease. This relationship is suggested by the close resemblance between the symptoms of Graves' disease and the outward expressions of great fear.

Graves' disease, Dr. Crile writes, may be increased by giving thyroid extract or by experiences of fear. It may be diminished by removing part of the thyroid gland (or by partially interrupting the blood and nerve supply thereto) or by a complete rest. Any agency that can dispel anxiety will benefit the patient. The physical symp-

toms have, in part, a psychogenic basis, and they can sometimes be removed by psychotherapeutic means.

Dr. Crile writes: "The striking benefits of good luck, success, and happiness; of a change of scene; of hunting and fishing; of optimistic and helpful friends, are at once explained by this hypothesis. One can also understand the difference between the broken body and spirits of an animal in captivity and its buoyant return to its normal condition when freed."

One often hears the advice, "Don't worry." This advice is sound enough from the standpoint of mental hygiene; but often it is impractical since the bodily changes of anxiety are involuntary and little affected by a determination not to worry. When a student is awaiting an important examination, he does worry. When a patient is awaiting the entrance of the dentist with his instruments of torture, he worries despite his determination not to do so.

The technique of distraction—attending to some other activity—may temporarily reduce anxiety. The knowledge that there is some escape from the situation also helps. For example, a dentist once told his patient that if the pain were intense, he would stop drilling whenever the patient raised his hand. This knowledge that there was an escape from the pain reduced the patient's anxiety and he thought, "If the pain is no worse than this, I can take it."

In some fortunate cases it is possible to reduce anxiety by changing the situation so as to remove the threat or the source of worry.

It is medically important to distinguish between those mental states (latent attitudes and habit organizations) which produce no physical symptoms and those which do. In simple words, some mental states of an individual are pathogenic in the sense that they lead to ill health; others are not.

In another place we distinguished between latent organization and motivation (pages 90-91). It should be made clear here that anxiety, although it is a long-drawn-out, enduring process of the organism, is rarely in a latent, quiescent state (like a latent attitude) but is usually an active, disturbing condition. This distinction is important in the present context because, presumably, truly latent organization can have no ill effect upon health (unless activated). We assume that only motivating factors can produce untoward symptoms. If, for example, anxiety leads to ill health and nervous breakdown, we

assume the existence of some bodily tension and an actual excitation of the vegetative organs as a result of the tension.

MOTIVATION IN RELATION TO EMOTIONAL DISTURBANCE

In the foregoing pages we have considered some of the specific attitudes which when activated, underlie emotional disturbances—attitudes of inferiority and pride; attitudes of love and hate based upon sexual satisfaction or frustration, as well as upon non-sexual factors; fear attitudes based upon some threat to the security of the individual. Elsewhere in this book we have referred to other attitudes and motives—resentment and the determination to retaliate, the attitude of disgust, the attitude of amusement, and a host of specific determinations which are excited during emotional behavior.

Attitudes are often non-motivating for long periods of time. Thus, love attitudes exist passively even though there is no overt determination to approach and caress or care for the mate. Again, the fear of rattlesnakes exists as a latent attitude when no reptile is around to arouse action. By definition, a latent attitude is non-motivating, and therefore it cannot evoke any emotional disturbance. It must first be aroused by an external situation, when it becomes a motivating factor.

Emotion arises only when the individual is definitely motivated. In every emotional upset some motivating factor is thwarted, or satisfied, or excites the individual.

In view of this fact we should inquire concerning the relation between motivation and emotional disturbance. What is this relationship? Can we distinguish and classify the main forms of emotional disturbance by referring to the underlying motives?

In considering the question we should recall our classification of the kinds of motivation. For convenience, motivating factors were classified according to their locus as organic and environmental. The environmental factors were further subdivided into two groups, social and non-social (pages 94-96). Do these distinctions of the source of motivation aid us in classifying the forms of emotional disturbance? We shall consider this question now.

Can Emotions Be Distinguished and Classified by Their Motivational Sources? If we limit our consideration of the motivational sources of emotion to organic motives alone, we find it impossible to work out a satisfactory classification of emotions on the

basis of intraorganic conditions. In all the primary appetites—hunger, thirst, fatigue, sleepiness, the sexual appetite, air hunger, the eliminative appetites, etc.—the immediate source of motivation is intraorganic. But emotions have a wider field of origin than that: in emotions there is always an environmental factor (present or past) in the causation. Emotions arise from the total psychological situation, including both organic and environmental motivating factors.

Emotional disturbance arises from extreme excitement of the organism, from frustration or conflict, from abrupt satisfaction; but any appetite may underlie the excitement, frustration, conflict, abrupt satisfaction. If we attempt to define an emotion in terms of its specific underlying appetite, we run into difficulties the nature of which will be illustrated by reference to the sexual emotions.

The phrase *sexual emotion* is commonly used by both laymen and psychologists. It clearly indicates that there is a factor of sexual motivation underlying certain emotional disturbances, but it does not help us to distinguish the separate varieties of sex emotion. In the discussion of sex emotion earlier in this chapter, it was pointed out that there are emotions due to excitement, to frustration and to satisfaction of the sex motive.

These different forms of sexual emotion can be distinguished, not in terms of intraorganic motivation but only in terms of the known external situation. The point is illustrated in the emotions of sexual frustration. In these emotions the form of the emotional outbreak varies with the frustrating circumstances. In jealousy, frustration is produced by a rival or an intruder. If an individual is jilted, or if he discovers the disloyalty of his mate, an intense emotional upset occurs—sometimes even with threats of suicide, etc. In bereavement, the emotion of grief produced by the death of the mate is accompanied by a degree of sexual frustration. In romantic love, frustration (in our own culture) is produced by moral, social and personal considerations which prevent the completion of the sexual act. These forms of emotion due to sexual frustration—jealousy, romantic love, emotions accompanying loss of the mate through bereavement or otherwise—are strikingly different from each other. Their differences are not differences of organic motivational source—sexual hunger is present in all of them. They are differences depending upon the way in which the sexual motive is frustrated and the circumstances which do the thwarting. Plainly, these forms of sexual emotion could not

be identified and classified on the basis of intraorganic motives alone.

The same principle is exemplified in a hungry dog; he will become enraged and fight if another animal steals his food; he will show joy, by salivating and wagging his tail, if his master brings him a piece of meat. In both types of emotional response the motivational source is hunger for food; it is the frustration or impending satisfaction which arouses the emotion. This is true of all the appetites—hunger, thirst, fatigue, sleep, and so on—and of other motivational sources as well.

It is important, therefore, to distinguish between motives and emotions. A classification of the sources of motivation which underlie emotional disturbance is quite a separate thing from a classification of the emotions themselves.

Situation and Response as a Basis for Distinguishing the Forms of Emotional Behavior. It is significant that after extensive investigations of fear, rage, and pain, Cannon and collaborators were not able to distinguish among these emotional processes on the basis of internal bodily changes. The glandular secretions, the chemical changes in the blood, and the processes within the smooth muscles are similar in fear, rage, and pain. The bodily changes prepare the organism for the prolonged and vigorous action which is likely to be necessary in a biological emergency. The internal preparation is one and the same for fear, rage, pain. How, then, can these forms of emotion be distinguished from each other if not on an intraorganic basis?

The answer is that they can be distinguished in terms of the inducing situation and the response of the organism. In fear, the external situation is one which threatens harm (pain, injury, death, social humiliation) and the organism's response is an escape or an attempted escape. If escape is blocked, the fear becomes intensified into terror. In anger, some motive is frustrated and this frustration is met by hostile attack. The organism turns toward the frustrating agent to remove or destroy it. If he is highly motivated but unable to reach the enemy, anger heightens into rage. In the agony which results from actual injury or in milder forms of painful excitement, the organism makes aimless, uncoordinated movements.

Thus, it is the situation-response relationship which enables us to distinguish forms of emotional behavior, and not the internal bodily

state. This principle can be illustrated by another group of affective processes—the *social feelings and emotions*.

Feelings of inferiority and personal pride rest upon the individual's comparison of himself with others in some respect. Feelings of remorse and the sense of guilt rest upon the individual's evaluation of his conduct in terms of standards derived from the social group. Feelings of shame are relative to the customs and taboos of the culture in which he lives. Feelings and emotions of embarrassment depend upon the social situation; a speaker, for example, is embarrassed when he has to stand before a large and impressive audience for the first time. These and other social feelings, discussed elsewhere in this book, are mentioned to show that the basic distinctions are made in terms of the social situation and the individual's response thereto and not in terms of the intraorganic processes.

In general, if we wish to acquaint ourselves with the forms of *emotional behavior*, the best procedure is to analyze the external situation and the organism's response to it. The situation-response formula makes it possible to describe the development of habit organization and attitudes as well as patterns of response, their maturation and modification through conditioning. The formula is useful, also, in the experimental analysis of conflicts and of the attitudes and motives which underlie them.

The situation-response formula is especially serviceable in studying the *integrative* aspect of emotional behavior rather than the disruptive.

Causes of Emotional Disturbance. In the light of the discussion in Chapter VIII and this chapter it may be said that there are three main exciting causes of emotional disturbance. An emotional upset may be brought about by: (1) extreme excitement or depression (increase or removal of stimulation); (2) frustration or conflict; (3) relief or satisfaction.

In each specific emotional disturbance some particular attitude or motive is involved, but in each the immediately exciting cause is some excitement or depression, frustration or conflict, relief or satisfaction. Thus, Billy is frightened upon meeting a barking dog; the large animal excites a fear attitude in him. Again, John is jealous upon seeing Mary with another young man; the love attitude is aroused and the motive frustrated. Lastly, Jim is overjoyed upon the receipt of an unexpected bequest of \$100,000; many of his desires can be fulfilled.

CONCLUSION

Attitudes and motives underlie emotional disturbances but are psychologically distinct from them. The persistent attitudes which are developed within the individual play an enormously important rôle in the affective life. This is especially true in attitudes of self-regard, in attitudes of love and hate, and in attitudes of fear. To understand an emotional disturbance one must take account of the attitudes and motives which constitute its background of predisposing causes.

Emotions can be described in terms of the inducing situation (stimulating circumstances) and the response of an organism to that situation. The stimulus-response formula is a prerequisite to the understanding of emotional disturbances and also to a description of the attitudes, motives, and states of conflict which underlie emotional behavior.

The direct exciting causes of emotional disturbance are of three main kinds: (1) excitements or depressions produced through a marked increase or decrease in stimulation or through a change in the excitability of the organism; (2) frustration or conflict of motives; (3) abrupt satisfaction or relief.

In analyzing an emotional disturbance one must take account of the exciting causes and of the predisposing attitudes and motives as well.

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Note upon conflict and adjustment

Affective psychology is intimately related to two important topics of psychology: on the one hand, motivation; on the other hand, adjustment. The practical problems of adjustment arise in the areas of personnel psychology, counseling, and mental hygiene. Affective psychology is important to the worker in these fields because a knowledge of this branch of psychology aids in locating attitudes and motives, frustrations and conflicts, and interests and other sources of satisfaction.

For general references upon conflict the books by Guthrie and Luria, listed on page 334, may be seen. On adjustment, the interested student should certainly consult the works by McKinney (1941) and Shaffer (1936). In the area of sexual adjustment, the very informing book of Landis and associates (1940) is available.

GENERAL CONCLUSION

If there is one general conclusion which emerges more conspicuously than any other from this survey of feelings and emotions, it is that these processes are exceedingly complex. They are so complex that to discover a semblance of order within the observed facts the man of science must consider them from several different points of view and must clearly demarcate each area of approach.

In making a study of emotion and related processes, the formulation of verbal definitions is important, but not so important as drawing certain distinctions which can be operationally defined. Such distinctions, if fundamental and sound, will clarify the confusion existing in affective psychology and provide a basis for formulating a comprehensive definition of the concept of emotion. The distinctions should also mark off fields for future investigation.

What, we now ask, are the basic distinctions which have been drawn in this study of feelings and emotions?

Some Basic Distinctions Relating to Emotion. Perhaps the most basic postulate we have made is that an emotion is a unitary event or process in nature which can be described in diverse ways from different points of view. Of the various points of view three, at least, are of primary importance to the psychologist: (1) the standpoint of the experiencing individual, by whom an emotion is viewed as a conscious experience; (2) the physiological point of view, from which emotion is revealed as a complex series of internal bodily changes; (3) the behavioral standpoint, from which an emotion appears as an observable activity of the total organism interacting with its environment. From each of these points of view a description of emotion can be made. Despite the diversity of the descriptions, they can all be brought together into one consistent definition. This fact implies that an emotion, however complex it may be, is a unitary event.

A very fundamental distinction is that between *organized* and *disorganized* activity. It is important to make this differentiation

because disorganization of behavior is always one of the distinguishing characteristics of emotion. The countless activities of everyday life are usually well organized. The individual carries them out in a smoothly integrated manner. Occasionally, however, organized activity is disrupted by circumstances within the psychological situation. This disruption of behavior is not necessarily emotional in character; a non-emotional distraction or disorientation may also disturb the activity in progress. The disruption is an emotional one if the individual is so acutely upset that his behavioral disorganization is accompanied by a disturbance in the functioning of bodily structures regulated by the autonomic nervous system—heart and blood vessels, lungs, the sweat glands, the salivary and gastric glands, the adrenals, and others.

Emotional behavior is *disturbed* behavior. It may be more or less disturbed, varying between wide limits from the mildest annoyance or satisfaction to the most severe emotional seizure.

Emotional disorganization shows itself in behavior in a variety of ways. It may appear as a disruption of the activity in progress when emotion arises, as vocalization and aimless movement, as interference with the process of learning, as a loss of precision in carrying out skilled activities, as a well-marked series of changes in the functioning of glands and smooth muscles which are brought about through the autonomic nervous system, and, in general, as a regression from cerebrally controlled activities to those which are regulated at the midbrain level.

Even in the most highly disorganized activities there are some well-organized and integrated physiological and behavioral elements. This leads us to another necessary distinction—that between emotion and emotional behavior. This differentiation, which may at first glance appear to be a hair-splitting one, is important because of essential psychological differences between the two conceptions. *Emotion* is the broader, more inclusive, of the two terms; it designates an acute disruption of the whole individual, manifest in behavior, subjective experience, and internal bodily changes. Emotion is always a disruption. *Emotional behavior*, by contrast, is the total behavior which an individual manifests during emotion. It contains organized elements—integrated patterns and activities—as well as the marks of disruption characteristic of emotion.

If emotional behavior is examined from the standpoint of the organized activities which are present within it, at least two forms of integrated activity are seen. First, there are well-integrated reflexive patterns of response—such as the rage pattern, crying, smiling, and laughing. These reflexive patterns make their appearance so uniformly during certain emotional disturbances that they may serve as a basis for recognizing and distinguishing the emotions with which they are associated. Reflexive patterns of response should be investigated both for their own sakes and for the light their study sheds upon emotional upset.

Second, there are persistent, purposive activities which arise during emotional upset and which are a part of emotional behavior. Thus, fear is associated with impulses to escape, anger with aggressive attack, sexual emotion with fondling and caressing. Inasmuch as these purposive activities are integrated, they cannot be components of *emotion*—emotion being always disruptive—but they are a part of *emotional behavior*. Thus, emotional behavior includes both integrated components and the signs of disruption.

The association of certain purposive activities with emotional disturbance is not accidental. The psychological situation which arouses a disturbed state of fear evokes also the precipitate flight from danger. The situation which arouses the emotion of anger also produces aggressive behavior. Thus, organized and disorganized processes normally arise out of the same psychological situation.

Another basic distinction relates to the causes of emotion. There are direct and present determinants of emotion (*exciting causes*), on the one hand, and indirect and past conditions which predispose the individual toward emotional disturbance (*predisposing causes*), on the other.

The *exciting causes* of emotional disturbance are of three main kinds: first, a sudden, marked increase (or a decrease) in intensity of sensory stimulation. If a sensory stimulation of the organism—especially a painful one—is increased in intensity, there is typically an increased level of activity associated with general excitement which, with a certain degree of stimulation, goes over into emotional disruption. Great pain can upset almost anyone emotionally.

A second exciting cause of emotion is frustration (including conflict, which is a special form of frustration). If, for example, the

individual is highly motivated and oriented toward a specific goal, but is definitely blocked, an emotional upset is likely to occur. Similarly, if an insult is given, causing a state of conflict over the level of self-esteem, anger usually arises. Mental conflict, especially when it involves something important to the individual, is a major source of emotional disruption.

A third exciting cause of emotion is a sudden release of tension or the complete satisfaction of an appetite or desire. Good news suddenly received, the termination of war in victory, the climax of a funny story or practical joke, the satisfaction of sexual and other appetites, typically induce a pleasing form of emotional upset through the release of tension.

The *predisposing causes* of emotional disturbances may, for convenience, be classified as psychological and physical.

Predisposing psychological causes are found within the past history of the individual. Previous excitements, frustrations, and satisfactions have left their marks upon the individual. Attitudes, motives, and states of conflict, built up in the past, furnish the background out of which present feelings and emotions arise. A fear experience, for example, when once repressed, may determine a persistent phobia which, in turn, gives rise to repeated subsequent fears. Similarly, neuroses and states of anxiety, once they have been built up, may persist as a basis of repeated affective disturbances.

The physical causes which predispose the individual toward emotional disturbance are complex. The total biochemical state of the organism, as regulated by the endocrine glands, by diet, exercise and rest, by the state of health, and by hereditary factors, determines emotional sensitivity. Hunger, fatigue, and present or previous illnesses predispose the individual to relatively frequent and violent emotional outbreaks. Further, the permanent emotional characteristics (temperamental traits) of the individual depend, to a considerable extent, upon the above-mentioned and other physical factors.

Other basic distinctions emerge when the question is raised, *What are the chief varieties of emotional disturbance?*

From a strictly subjective point of view an important distinction has been drawn between pleasant and unpleasant affective experiences. At the present time pleasantness and unpleasantness must be regarded as primary psychological data. They have been neither

resolved into sensory experiences nor perfectly correlated with any physiological change. Viewed objectively, however, different forms of affective reactions can be distinguished. In the young infant the responses of smiling and laughing, of frowning, crying and screaming, can be clearly seen and heard. These objective manifestations of primitive delight and distress can be studied without any reference to pleasant and unpleasant feelings as such. The affective behavior of adults cannot with certainty be correlated with experienced pleasantness and unpleasantness; social conventions modify adult expressions of feeling. In spite of this, felt pleasantness and unpleasantness can usually be inferred from adult behavior.

Another way in which emotional activities can be compared with each other is in terms of the degree of excitement manifest by the subject. Within each form of emotion there are variations in the level of general activity. Rage, terror, horror, and excitement from severe pain, ecstasy, and other intense emotions are characterized by a high level of general activity, with excessive random movements and uncontrolled vocalizations. Milder degrees of the same emotions—anger, fear, joy, moderate excitement—are marked by a somewhat lower (but still definitely elevated) activity level. With still lower degrees of emotional intensity there are correspondingly low levels of activity. An important exception to this principle is the commonly recognized paralysis of action sometimes occurring in intense fear and severe shock. Grief, too, is at times characterized by quiescence and a general depression of the activity level.

The commonly accepted distinctions among the main varieties of "emotion" (disregarding subjective experience) are really distinctions among forms of *emotional behavior*. These distinctions are usually drawn in terms of the psychological situation and the individual's organized response to it. Thus, if the situation is one of danger and if integrated escape occurs along with signs of emotional disturbance, the emotional activity is recognized as *fear*. If the situation is a frustrating one which provokes attack, the emotional upset is accepted as *anger*. If bodily injury is associated with outcries and with writhing or other aimless movements, the emotional behavior is distinguished as *painful excitement* or *agony*. If a foul-smelling or foul-tasting object is encountered which induces nausea, the emotional disturbance is classed as *disgust*. If the sexual motive is blocked by

an intruder and the frustrated lover shows an aggressive reaction to the situation, the resultant disturbed state is recognized as *jealousy*. Thus, it is the organized, purposive behavior induced by a particular disturbing situation which is the everyday basis for classifying the forms of emotional behavior. It is to be understood, of course, that signs of emotional disruption are always coexistent with the organized activity in emotional behavior.

Still another distinction which is important to the psychologist is that between emotions and attitudes, an emotion being an acute, relatively brief disturbance of the individual, and an attitude a more or less permanent condition, persisting over months or years. Further, an emotion is an actual process involving the whole individual, and an attitude is a predisposition within the individual to respond in a particular way either toward or against some object. An attitude is assumed to exist and is not directly observed; we observe the manifestations of an attitude in bodily posture, word, and action. Attitudes profoundly influence our perceptual world, color all our memories and thoughts, and even make our actions and affective reactions in good part what they are. In the popular mind attitudes and emotions are often confused and designated by the same terms. But the psychologist must distinguish between such *attitudes* as fear, resentment, love, disgust, and amusement (chronic predispositions to respond in specific ways) and acute, temporary states of emotional disruption which are called by the same names.

Another distinction is that between attitudes and motives. Attitudes are usually latent, not motivating, but they may be activated by appropriate situations. Motives, by definition, are factors which arouse the movements observed as behavior.

The great bulk of our conscious motives are derived from the social environment or at least they are shaped in some way by it. But physiological factors play a fundamental rôle in motivation. Organic states—hunger, thirst, sexual appetite, fatigue, sleepiness—motivate the organism and lead to the development of purposive behavior. These internal motivating states are designated as *appetites* and must not be confused with emotions.

Whereas appetites have their basis in the internal bodily state, emotions arise from the total psychological situation. To illustrate, the appetite of thirst is built up by water deprivation, and physiologically

it is a persisting organic state. The emotion of anger is evoked in a thirsty man when someone deliberately withholds water from him.

The final distinction in this series of distinctions, and obviously the most important one in a treatise upon emotion, is that between emotional and non-emotional processes—between emotion and non-emotion. This distinction calls for a definition of emotion which states the criteria for recognizing it and for differentiating it from other psychological processes. The following definition presents the criteria for identifying emotion: *An emotion is an acute disturbance or upset of the individual which is revealed in behavior and in conscious experience, as well as through widespread changes in the functioning of viscera (smooth muscles, glands, heart, and lungs), and which is initiated by factors within a psychological situation.*

If all the criteria included in this definition are satisfied simultaneously by a given process, it is an emotion, and can be distinguished from non-emotional processes.

Throughout this study of emotion a central point of reference has been the *individual* who experiences an emotion and reveals it in behavior.

The investigation of the individual is a central task of affective psychology and of the entire science of psychology. In spite of the diversity of the facts, psychological interpretations converge upon the individual as the chief object of investigation. There are not two individuals, a mind plus a body, but only one. This single individual possesses the attributes which the available facts compel the psychologist to impute to him.

The study of emotion throws light upon the individual. The individual feels pleased and displeased, experiences rage, fear, disgust, joy, grief, and other emotions. These emotions are revealed in behavior and through internal bodily changes as well as in conscious experience.

The affective development of an individual is simply that phase of his development which is revealed through the affective processes. The story of an individual's affective development includes the history of his interests, aversions, esthetic tastes from infancy to adulthood, and an account of the factors which have produced them, of conflict states and neuroses, of attitudes and motives including prejudices and

tender spots within the personality. Affective development is the ordinary development of the individual so far as it is related to the affective processes.

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